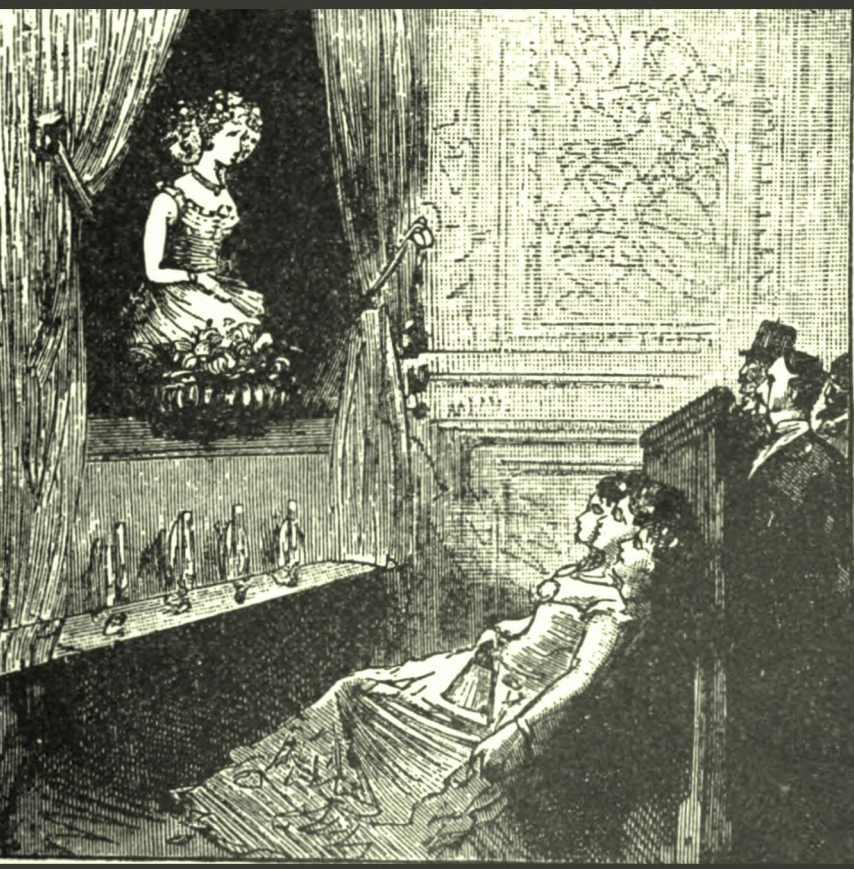

Secrets of wise men, chemists and great physicians

William King David

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Escapador
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Yours truly,
Wm. K. David.

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SECRETS

OF

WISE MEN, CHEMISTS

AND

GREAT PHYSICIANS.

COMPILED AND WRITTEN BY

WM. K. DAVID,

AUTHOR OF

THE SHORT-RULE ARITHMETIC
AND ACCOUNTANT'S REFEREE, PERPETUAL
DISK CALENDARS, ETC.

Thirty-Eight Illustrations.

1889.

WM. K. DAVID

PUBLISHER,

LOCK BOX 507,

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PREFACE.

It is surprising how many large enterprises and fortunes depend upon some few simple trade secrets the knowledge of which has baffled competition and crushed all rivalry. The jealous care with which special information in trade and manufacture is guarded frequently renders it a monumental task to procure a single receipt or formula. Some idea, then, may be formed of the vast amount of labor and expense necessary to compile a work of this character. Books of recipes are quite numerous, but to the average person the good they contain is too often buried beneath a mass of wordy rubbish. In the preparation of this work the object has been to present all the best as well as the latest practical receipts, prescriptions, and trade secrets. Over a quarter of a million pages of patent-office reports, encyclopedias, trade journals, receipt books, and other special publications have been carefully scrutinized. To the knowledge obtained from them we include the original matter procured from tradesmen, chemists, and the published works and private practice of some of the most eminent physicians both in this country and Europe, a greater portion of which has never before appeared in print; all of which has been carefully tested where any doubt existed. It will be found that few, if any, misleading directions have been given. The prescriptions have been reproduced, after careful thought, in the form in which they were originally written. In having them filled patronize only honest and capable druggists. In testing the recipes follow the directions with rigid care, and practice on a small quantity of the article until you get it right. Realizing that perfection in anything has never been attained, yet we believe that the work contains more really practical information for use by the masses in every-day life than any similar publication.

CHICAGO, March, 1889. THE AUTHOR.

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PART I.—MISCELLANEOUS.

Gelatine Copying Pad.

[HEKTOGRAPH.]

By this process a letter, postal card, drawing, or other manuscript can be duplicated from sixty to one hundred times from one original. Reproductions from the copying pad are now admitted in the mails as third-class matter, i. e., one cent for every two ounces or fraction thereof. A soft, gelatinous composition, similar to that used in making printers' rollers, is made and poured into shallow pans of the required size. The pans should be made of stout zinc one-half inch deep on the inside, with a lid or cover. The length and breadth of the pans is determined by the class of copying to be done. Always make the pan slightly larger than the paper used. The three sizes given below will answer most purposes:

Postal card size	4x6 inches.
Note paper size	6½x10 inches.
Full letter size	9x12 inches.

The composition is made as follows:

Good glue	4 ounces av.
Glycerine	16 ounces av.
Water	8 fluid ounces.

Break up the glue and soak in the water for a few hours, then heat by water-bath until melted. Next add the glycerine and heat together for some time to evaporate part of the water, and then strain into the pan, which should be placed perfectly level and filled about two-thirds full; skim with a card to free from bubbles, and set away to cool. An improvement consists in adding one ounce of carbonate of barium to the fluid while warm. The composition should be made somewhat softer for winter use than for summer, which can be done by adding a little larger proportion of glycerine. Another way to make the composition is to soak over night in cold water best gelatine or glue 1 part, and the excess of water poured off. The glue is then warmed in a water-bath with the addition of from 10 to 12 parts of glycerine, to which may

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be added 4 to 6 parts of finely ground heavy spar, and one part dextrine thoroughly mixed by constant stirring. (In summer less glycerine.)

The letter or sketch to be duplicated is written on a sheet of paper with ink specially prepared for the purpose (see inks). For the original it is best to use smooth, well-sized writing paper, allowing the ink to dry without using a blotter. After writing the original place it face downward on the pad, and rub it gently with the hand to insure contact at every point. Let it remain from two to six minutes, according to the number of copies you wish to print. In cold weather it should be left longer, as it requires more time for the composition to absorb the ink. Remove the original carefully, and a reversed impression will be observed on the pad. To take off copies lay dry sheets of paper on the reversed impression, press gently, and remove quickly.

When you have taken all the copies you require wash the ink from the surface *at once* with a sponge and plenty of luke-warm water; **never use hot water.** The surface of the composition will allow considerable rubbing without fear of tearing it, if not done roughly and carelessly. Be sure your sponge is free from sand and grit, and also avoid scratching with the finger nails. Always wash the surface with a sponge before using, and dry with a newspaper. In cold weather if the composition feels chilled it will not absorb the ink properly, and the copies will be faint unless it be carefully warmed to a moderate temperature. Attention to these details will produce the most gratifying results.

Foliotypes.

Horace M. Engle, Esq., of Marietta, Pa., has devised a method of taking leaf-prints of marked beauty, which he terms "foliotypes," some specimens of which he sent to Dr. Gray, the eminent botanist, who pronounced the process a new way, and advised him to send an account of it to the *Botanical Gazette*, which he generously did. We have employed the method according to the explanation there given (which we reprint in full) with the most delightful results, having secured prints of some beautiful leaves which are faithful to nature in color and outline, with all their delicate tracery: "The method is of actual usefulness to the botanist, as well as a refining recreation for others who love Nature 'on general principles.' For illustrating monographs and similar papers, where the number is too limited to warrant an expensive lithograph; for identifying a rare specimen, or as an adjunct to an herbarium, combining portability, unalterability, and beauty withal the method seems particularly fitted. But aside from this others may find a delightful and instructive recreation in taking prints of the entire flora of the old farm, the trees of a certain grove, the native annuals of a county, the ferns of a State, or any other special field that seems most inviting. Such copies may be taken in a blank book suited to the purpose, or, better, take them on single sheets of uniform size, as in this

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way imperfect copies may be thrown out, and when the work is completed they may be named, classified, and bound, making a volume of real value and worthy of just pride.

"The process consists in using the leaf for producing an impression as a printer uses type, the ink being green, and the pressure applied either by hand or with a press. There will be needed for the work (1) a small ink roller such as printers use for inking type by hand in taking proofs; (2) a stout window glass (10x12 is a good size) fastened securely (not glued, as it may warp and break,) to an evenly planed board about twice its surface, say 10x24. A small quantity of the ink is put on the glass and spread with a knife, after which it is distributed evenly by going over in all directions with the ink roller. When this has been carefully done the leaf to be copied is laid on a piece of waste paper and inked by applying the roller once or more with moderate pressure. This leaves a film of ink on the veins and network of the leaf, which should then be placed on a piece of blank paper and considerable pressure applied for a few moments. When the leaf is removed from the paper the work is done.

"To get the best results several points must be carefully noted. Get a quarter or half a pound of dark green ink, which is put up in collapsible tubes costing from fifty cents to $2 per pound, according to quality. As sold it is invariably too thick for this purpose, and should be thinned by adding several drops of balsam of copaiba to as much ink as may be taken on a salt spoon. Much depends on the proper consistency of the ink. In inking the leaf is liable to curl on the roller, but it should part readily from it. In case it sticks tightly the ink is too thick. Take care that the ink is evenly distributed on the glass and roller, as it is essential that each part of the leaf receives an equal coating of ink. If the leaf is large ink it part by part, keeping the roller well supplied. A roller three inches long, costing forty cents, will answer for all small leaves and branches of plants. Clean the roller and glass with benzine after using. If the leaf is finely veined the lower surface makes the better print, but if the veins are coarse and large the upper surface may be used. If the specimen is fleshy or brittle allow it to wilt until it becomes more pliable, or if necessary it may be pressed and dried first. In most cases the best copy is obtained after taking one or two impressions, as the leaf takes the ink better after several applications. A good quality of unsized paper that is made slightly damp by placing between sheets of moist newspaper is best for general work, but in other cases well sized paper will take a copy that will allow a foliotype (may I coin the word?) to bear inspection side by side with a good lithograph. I find a copying press very valuable in making the impression, especially if the leaf is at all coriaceous. If it be soft it should be covered with a few thicknesses of newspaper. If it is irregular in thickness, paper may be laid over the thin parts, so that equal pressure is received. This is necessary with all leaves that have thick stems. If the branch is very irregular or delicate, or in the absence of a press of any kind, the specimen may be covered with several layers of paper, and held in place by

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one hand while the pressure is applied by the thumb or palm of the other hand as required.

"These particulars are as complete as practicable. Experiments will lead to many improvements in details. Employ tact and neatness, and you will be surprised at the result.

Fire-Extinguishers.

Hand Grenades.

Prof. F. S. Kedzie of the Michigan State Agricultural College, after a series of analyses and experiments, draws some important conclusions as to the value of hand-grenades, in a paper which he publishes in the Chicago Sanitary News. A Harden hand-grenade was opened, and the solution contained qualitatively analyzed. It consisted of common salt, sulphate of lime, and a small amount of acetate of soda. The principal ingredient was common salt.

The effort was made to determine (1) whether the solution in the grenades had any more extinguishing power than water; (2) if the solution had extinguishing power greater than water, what was the essential ingredient in the solution. The question that first arose regarding the composition of the grenades was: Did they contain carbon dioxide gas or any substance that would give up the gas by being heated? Opening the grenades under water and collecting the gas that escaped it was found that the average amount of carbon dioxide contained was about one cubic inch per grenade. Boiling the solution liberated a slight amount of gas in addition; but altogether the gas was not enough to be of any practical benefit in extinguishing fire. It was then certain that the extinguishing power was in the solution itself. Replacing the solution in the grenade with pure water the extinguishing power, while greater than water thrown from a dish upon flaming boards, was still much less than the power exerted by the solution.

By a careful series of trials it was found that the essential ingredient was common salt. From a number of experiments it was found that when a grenade, or a bottle containing a strong brine, was broken in the midst of the burning kerosene the flames were almost instantly extinguished. A vapor seemed to spread in all directions from where the salt solution struck the board, extinguishing the flame as it went. Strong solutions were also made of sulphate of soda, hyposulphite of soda, borax (biborate of soda), and bicarbonate of soda and tried as fire extinguishers. Some worked as well, but none any better, than common salt in extinguishing fire. The experiment was then made of charging the bottles with brine and generating carbon dioxide by adding lime dust and sulphuric acid and corking tightly. No practical increase in extinguishing power from this addition was noticed. In most instances the carbon dioxide gas escaped from the bottles inside of four days, proving that it is impracticable to attempt to use glass vessels with corks as a means of storing CO_2 under pressure for fire extinguishing.

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The conclusion reached from these and many more experiments was that the Harden grenade solution possesses *much greater* extinguishing power than water alone, and that it owed this power to common salt held in solution. We then constructed some home-made grenades, using flat bottles bound together side by side with wire. Using two bottles in this way insures their being broken in striking the burning body, which would not always occur when only one bottle is used. Bottles thus charged with brine and bound together were broken side by side with the Harden grenades and found to be equally valuable.

It thus appears from the experiment that any person can construct as good and effective grenades as those offered in the market at $7 and $10 per dozen. Bottles filled with brine and placed around the premises will afford considerable protection, especially when used upon the flames when the fire just begins. Salt solutions have the further advantage of not being easily frozen—never enough to burst the bottles.

The Lewis hand fire-extinguisher was next investigated. This consists of a tin tube about two feet long containing thirty-four fluid ounces of soda in weak caustic ammonia. From the trials made we could not notice any appreciable superiority over the salt solution as used in the Harden grenade. It has the disadvantage of not being made to break by being thrown, but must be opened by having a cork extracted from one end of the tube, requiring a smart jerk. The solution is then sprinkled on the fire by the operator.

We herewith append a number of fire-extinguishing compounds, all of which are highly recommended by various authorities:

Munich Fire-Extinguishing Powder.

Common salt	43 per cent.
Alum	19.5 per cent.
Glauber's salt	5.1 per cent.
Soda	3.5 per cent.
Water glass	6.6 per cent.
Water	22.3 per cent.

Richardson's Fire-Extinguishing Powder.

Alum	4½ pounds.
Common salt	10 pounds.
Glauber's salt	1 pound.
Soda	1 pound.
Water glass	1½ pounds.

Vienna Fire-Extinguishing Powder.

Green vitriol	4 parts.
Ammonium sulphate	16 parts.
Water	100 parts.

Proteau's Fire-Extinguishing Powder.

Carbonate of soda	8 pounds.
Alum	4 pounds.
Borax	3 pounds.
Carbonate of potash	1 pound.
Silicate of soda solution	24 pounds.

Mix thoroughly and add 1½ pounds of this mixture to each gallon of water, when required.

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Transferring Photographs.

[ON GLASS.]

This beautiful and valuable process of transferring photographs in plain or colored work has been taught at high prices under various high-sounding names, such as "Roman art," etc. Photographs can be transferred and preserved for years which would have been soiled, faded, and ruined if allowed to remain on the card.

Separate the paper print from the background or card by steaming it, after which dry thoroughly. Warm the glass slightly and coat evenly with balsam or negative varnish and place the print face downward on the surface thus prepared. After smoothing it carefully set away in a cool place until the varnish has hardened. Then apply water, and with a soft piece of gum rubber rub off the paper so as to leave the photographic image on the varnished glass.

Stamping Patterns.

Draw the pattern upon heavy paper and perforate with small holes all the lines with the point of some sharp instrument, dust the following powder through the perforations, remove the pattern and pass a warm iron over the fabric, when the pattern will become fixed. Any desired color can be used, such as Prussian blue, chrome green, yellow, vermilion, etc.:

Fine white rosin	2 ounces.
Gum sandarac	4 ounces.
Color	2 ounces.

Powder very fine, mix, and pass through a sieve.

Magic Paper.

[FOR TRANSFERRING AND COPYING.]

This paper is really a valuable article, and is manufactured and sold under various names, such as the "stylograph," "rapid copying process," etc. It is used principally by salesmen in keeping a record of their sales, as three copies can be taken simultaneously with one writing. In this way traveling salesmen can with one writing give a copy of his sale to his customer (which is frequently demanded), another he can send to his firm, and retain the third one for his own use. It is used in a similar manner in nearly all the large stores, and by many individuals in their business correspondence. It is also valuable for transferring figures in embroidery and taking impressions of leaves for herbariums, etc., which it does beautifully, but for the latter purpose nothing equals the foliotype method previously explained.

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The paper is made by mixing pure lard or sweet oil to the consistence of cream with either of the following paints, the color of which is desired: Prussian blue, lamp black, Venetian red, or chrome green, either of which should be rubbed with a knife on a plate or flat surface until smooth. Use rather thin but firm paper; put on with a sponge and wipe off as dry as possible. Lay the sheets between uncolored paper or newspaper, and press by laying books or some other flat substance upon them until the surplus oil is absorbed, when it is ready for use.

FOR COPYING LETTERS AND ORDERS.—Either *two* or *three* copies can be made at one time, as desired. To make *two* copies place a sheet of the magic paper between the two sheets selected for the order, bill, or letter, and write upon the upper sheet with a hard lead pencil (the harder the lead the cleaner the copy). It is best to place a piece of hard cardboard under all the sheets while writing.

To make *three* copies use two sheets of magic paper, placing one between the first and second leaves and the other between the second and third leaves. Proceed as in taking two copies by writing upon the top leaf. A stout, thin linen paper will produce the best results, but almost any kind will do.

TO TRANSFER EMBROIDERY PATTERNS.—Place a piece of thin paper over the embroidery to prevent soiling; then lay on the magic paper and put on the cloth you wish to take the copy on to embroider; pin fast and rub over with a spoon-handle, and every part of the raised figure will show upon the plain cloth.

TO TAKE IMPRESSIONS OF LEAVES.—Place the leaf between two sheets of the magic paper and rub it over hard; then take the leaf out and place it between two sheets of white paper; rub again, and you will have a beautiful impression of both sides of the leaf or flower.

Cleaning Preparations.

Lightning Grease Renovator.

An excellent general preparation for removing grease, paint, etc.

Castile soap (cut fine)	4 ounces.
Hot water	1 quart.

Dissolve, after which add and mix thoroughly,

Aqua ammonia	4 ounces.
Sulphuric ether	1 ounce.
Glycerine	1 ounce.
Alcohol	1 ounce.
Water	1 quart.

An elegant general preparation for cleaning gloves, silks, etc., is made as follows:

Deodorized gasoline (or benzine)	1 pint.
Alcohol, chloroform, and ether, each	½ fluid ounce.

Mix, and perfume with cologne, lavender, or any desired odor. Do not use near a flame.

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"GANTEIN" FOR CLEANSING GLOVES.—The preparation sold under this name is made as follows: Dissolve 6 parts of soap in 2 parts of water; add 4 parts of bleaching liquor and ¼ part of aqua ammonia. Rub the gloves with the fluid until clean.

Cleaning Tarnished Silverware.

[IN USE BY ALL LEADING JEWELERS.]

Cyanide potassium..... 3 ounces.
Soft water..... 2 gallons.

Mix and dissolve. Label it "poison," and place out of the reach of children. Have the article clean and free from grease; dip in solution till tarnish is off, but no longer (and under no circumstances leave it in too long). After immersion the article must be taken out and thoroughly rinsed in a number of waters (warm preferred), then dried with a soft rag or sawdust.

Another method, which is safe and cheap, consists in using a saturated solution of hyposulphite of soda to which a little bolted whiting has been added. Apply with a brush or cloth until the tarnish is removed.

Clark's Wash for Carpets.

SOLUTION 1.—Dissolve 10 parts of soap in 20 of water, and add 3½ parts of soda and one-half part of liquid ammonia and spirit of wine.

SOLUTION 2.—Is the *actual cleansing liquid*, and consists of 4 parts of liquid ammonia and 3 of alcohol diluted with water.

The last solution is first used, and when the dirt loosened by it has been removed the soap solution is applied. Carpets thus treated regain their original colors in all their freshness, the entire operation of washing and drying a large carpet requiring but two hours, and the carpet need not be taken up.

Universal Stain Table.

Showing at a glance what means to employ in removing any kind of stain from any kiod of fabric. Red acid stains are destroyed by ammonia, followed by thorough washing with water. Burn stains of nitric acid are permanent. Great care must be observed when ether and benzine are used. Keep the open bottle and the fabric being cleaned away from an open fire or blaze. The ether especially is so volatile that an open bottle will take fire from a gas-jet or blaze several feet away if the draft is right. You cannot be too careful.

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UNIVERSAL STAIN-REMOVING TABLE.

KIND OF STAIN.	*From Linen.*	COLORED FABRICS. *Cotton.*	COLORED FABRICS. *Wool.*	*Silk.*
Sugar, gelatine, blood, albumen.	Washing simply in water.			
Fat	Soap-water, alkaline lyes.	Tepid soap-water.	Soap-water, spirit sal-ammoniac.	Benzine, ether, spirit of salammoniac, potash, magnesia, chalk, yolk of egg.
Varnish and oil-paint.	Oil of turpentine, benzine, and finally soap.			Benzine, ether, soap; careful rubbing.
Stearine.	Alcohol of 95 per cent.			
Vegetable colors, red wine, fruits, red ink.	Sulphurous vapors, warm chlorine water.	Washing in warm soap-water or liquid ammonia.		As above, rubbing gently and carefully.
Alizarine ink.	Tartaric acid; the older the stain the more concentrated the solution.	Diluted solution of tartaric acid, if the fabric permits.		As above.
Rust and gall-nut ink.	Warm oxalic acid solution, diluted hydrochloric acid, and finally tin filings.	Repeated washing with dissolved citric acid, if the fabric is dyed well.	The same as for cotton, but diluted hydrochloric acid if the wool is naturally colored.	Nothing can be done; all attempts only increase the evil.
Lime and alkaline lyes.	Washing simply in water.	Pouring diluted nitric acid drop by drop upon the stain. The stain previously moistened is rubbed off with the finger.		
Tannin, green nut shells.	Eau de Javelle, warm chlorine water, concentrated solution of tartaric acid.	More or less concentrated chlorine water, according to the nature and tint of the fabric, and alternate washing with water.		
Coal-tar, wagon-grease.	Soap, oil of turpentine, alternating with a jet of water.	Rubbing with lard, then soaping, and after a while washing alternately with oil of turpentine and water.		Same as for colored fabrics; use benzine instead of turp.; jet of water must fall on back of stain.

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Liebig's Washing Fluid.

SAVING HALF THE WASH-BOARD LABOR.

Sal soda	1 pound.
Stone lime	½ pound.
Water	5 quarts.

Boil a short time, stirring occasionally; then let it settle and pour off the clear liquid into a bottle or jug and cork for use. Soak your clothes over night in simple water; wring out and soap wrist-bands, collars, and dirty or stained places. Have your boiler filled with water, and when at scalding heat put in a teacupful of the fluid, then put in your clothes and boil for half an hour, after which rub lightly through one suds only, rinsing well in the bluing water, and all is complete.

For each additional boiler of clothes add half a cup of the fluid; of course boiling in the same water through the whole washing. If more water is needed in the boiler for the last clothes dip it from the sudsing tub. Soak your woolen and calico in the suds from which you have washed the white clothes, while hanging them out dipping in some of the boiling water from the boiler, if necessary; then wash out the woolen and calico as usual—of course washing out woolen goods before you do the calico. The fluid brightens instead of fading the colors.—*Dr. Chase.*

PREMIUM WASHING FLUID.—This fluid is equal to the best that can be prepared, and as it is recommended to be used in a simpler manner than the foregoing many will doubtless prefer it:

Sal soda	4 pounds.
Borax	2 ounces.
Sal tartar	1 ounce.
Aqua ammonia	½ pint.
Spirit of camphor	2 ounces.
Oil of turpentine	1 ounce.
Hot water	6 pints.

Dissolve the sal soda, borax, and sal tartar in the hot water and add the other ingredients. Soak the clothes over night in water to which has been added a table-spoonful of the fluid for each gallon of water; also add a little in washing water.

How I Iron Shirts.

BY MRS. HUSBANDPLEASER.

Take two ounces of spermaceti, one ounce of white wax, one ounce of paraffine. Mix and put in a saucer over a tea-kettle in which water is boiling, until melted, stirring several times. Then let it get cold, after which put in a clean box for use.

To make the starch: For two shirts, collars, and cuffs take one table-spoonful of starch dissolved in water; shave a piece of the above into it the size of a bean. Pour boiling water into it until thick, cook twenty minutes and set away to cool. Take one table-spoonful of starch, dis-

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solve it in cold water, and when the boiled starch gets lukewarm pour it over it, stir well, and strain. Have the garments dry and lay the starch on the wrong side and work it through. Be careful that the starch is rubbed in until the right side is wet all over. When well saturated roll up tight in a clean cloth. They need not lay but a few minutes. Stretch them on a bosom-board, and with a damp cloth rub out all the wrinkles. Lay a fine cloth over and iron it twice. If a collar or cuff turn it over and do the same on the other side. Take off the cloth and iron perfectly dry. If the bosom has pleats raise them before ironing dry and dry under them. After the bosom is perfectly dry (for this polishing process you need a good, smooth, hard board about two by one and a half feet—the harder the better— a marble slab of that size is better still), put the bosom on the bare board, dip a clean white cloth n water, wring almost dry, rub lightly over the bosom, then rub it with a dry cloth, and polish with back of iron or with polishing iron If any dirt gets on rub off with a damp cloth and polish again. The polishing is not necessarily done the same day they are ironed. If your time is limited, or your work interrupted by callers or other duties, lay them aside after having ironed them perfectly dry.

Liquid Washing Bluing.

Soluble Prussian blue..... 1 ounce.
Oxalic acid..... ½ ounce.
Boiling water..... 1 quart.

This makes the very best quality of bluing at a slight cost.

Family Washing Soaps.

We see no reason why every economical housewife should not profit by these simple methods of preparing cheap laundry soap, as they are the results of practical experience.

Best Soft Soap.

Take 4 pounds of white bar soap, cut it fine, and dissolve by heating in 4 gallons of soft water, after which add 1 pound of sal soda. Dissolve and mix thoroughly. If it is desired the soap can be made thicker by adding less water.

Hard Soap With Lard.

Sal soda and lard, each..... 6 pounds.
Stone lime..... 3 pounds.
Soft water..... 4 gallons.

Dissolve the lime and soda in the water by boiling, stirring, and settling; pour off, then return to the kettle (brass or copper), add the lard and boil it until it becomes soap. Then pour into a dish or molds, and when cool cut it into bars and dry it.

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White Hard Soap With Tallow.

Take 2 pounds each of fresh-slacked lime, sal soda, and tallow; dissolve the soda in 1 gallon of boiling soft water, stirring occasionally every few hours after which let it settle, pouring off the clear liquor and boiling the tallow therein until it is all dissolved; cool it in a flat box or pan, and cut into bars or cakes as desired. It may be perfumed with oil of sassafras or any other perfume desired, stirring it in when cool.

Cleaning Soiled Wall-paper.

The old form of this process was to use stale bread or bread baked to a proper consistency, but it seldom produces satisfactory results except in the hands of experts, and then it is an impossibility to keep from scratching the surface of the paper with the sharp points of the crust. A dough preparation known only to a few experts engaged in cleaning walls by contract, and who have been known to make from $5 to $25 per day, is now used, which is far superior in every way to anything yet discovered. The walls can be cleaned over and over again, each time appearing as bright as new paper.

Wheat flour.....Three parts.
Powdered prepared whiting.....One part.

Mix the flour and whiting thoroughly, and add enough water to bring it to the consistency of ordinary dough. Use by taking a small piece—about twice the size of a hen's egg. Press against the wall and remove the dirt by making long strokes. After making a stroke knead the dirt into the dough, and continue doing so until it is useless. A quart of the preparation used in this manner will clean the walls of a good-sized room.

When it is desired to keep the ingredients of the composition a secret a coloring matter may be added to assist in mystifying. When the walls are discolored by grease or marks where people have rested their heads, mix pipeclay to the consistency of cream, lay it on the spot and allow it to remain until the following day, when it may be easily removed with a penknife or brush.

Polishing Preparations.

POLISHING POWDER.—For polishing silver and nickel-plated ware, brass, copper, etc.:

Fossil silica..... 2 ounces.
Rouge (or fine crocus martis)..... ½ ounce.
Prepared chalk..... ½ pound.

Rub the fossil silica to a fine powder and thoroughly mix with the chalk. This will not scratch the finest surface. Use by rubbing with a damp sponge or rag, and finish dry with chamois skin or dry rag.

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Polishing Pastes.

Fossil silica	1 ounce.
Petrolatum	½ pound.
Cotton-seed oil (or sweet oil)	1 ounce.
Subcarbonate of iron	3 ounces.
Essential oil of almonds	30 minims.

Reduce the fossil silica to a very fine powder and mix it with the iron; melt the petrolatum, add the cotton-seed oil, stir in the powders, and while cooling add the flavoring oil and stir until ready to set, then run into boxes similar to ordinary blacking boxes. Apply with a soft rag dipped in the paste, and finish with a clean cloth. Prepared chalk or whiting can be used instead of fossil silica. The paste does its work faster than the polishing powder, and if the articles are very much corroded it is preferable.

Another excellent paste, which can be put in boxes or formed into balls and allowed to harden, is to take finely powdered rotten-stone, sift it thoroughly through muslin or a hair sieve, and knead with a sufficient quantity of soft soap to form a stiff paste. To ½ pound of this mass add 1½ fluid ounces of oil of turpentine.

Cleaning Powder for Show Windows, Mirrors, Etc.

Moisten calcined magnesia with pure benzine. The mixture should be preserved in bottles with glass stoppers, as the benzine is very volatile. Use by placing a little of the mixture on a wad of cotton and apply to the glass.

Marble Cleaning.

Rub with muriatic acid diluted with water, care being taken that it is not too strong. Repeat the process till clean, then wash with clear water. When the marble is very dirty, as in the case of old tombstones, use the following:

Muriatic acid	2 ounces.
Acetic acid	1 ounce.
Verdigris	1 drachm.

Mix, apply with a brush, and sponge off with clear water. Repeat until clean, then polish with pumice stone continually moistened with water as you proceed.

Furniture Varnish.

White wax	5 ounces.
Potash	7½ ounces.

Boil lightly for fifteen minutes, allow to cool, and then skim off the wax which floats on the surface. Apply the wax to the furniture, and by rubbing it an hour afterward with a woolen cloth a beautiful luster will be the result.

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French Furniture Polish.

This is the best article that can be made for restoring the luster and color of furniture:

Butter of antimony	3 fluid ounces.
Linseed oil	12 fluid ounces.
Alcohol	6 fluid ounces.
Shellac	2 ounces av.
Oil of turpentine	10 fluid ounces.
Hydrochloric acid	1 ounce.

Dissolve the shellac in the alcohol and add the linseed oil and turpentine; then add the hydrochloric acid and butter of antimony, which has been previously mixed, and thoroughly mix all together. Apply with a tuft of cotton, and finish by rubbing down hard with Canton flannel or a woolen rag.

Maple Syrup and Sugar.

[ARTIFICIAL.]

It is an astonishing fact that nine-tenths of the so-called maple sugar and maple syrup sold as the genuine articles are nothing more than clever imitations. The method of making the best quality of these imitations—and which really defies detection of a majority of dealers and consumers—is very cheap and simple, a gallon of the syrup costing about fifty cents and the sugar simply the cost of ordinary, cheap sugar. We were told by a Mr. Baldwin of Kentucky, a son of the reputed discoverer of the secret for producing the maple flavoring, that various manufacturers of imitation maple sugar and syrup in the large cities had paid his father thousands of dollars in royalties for his discovery.

Procure a quantity of the rough outside bark of what is known as scaly-bark hickory tree. Take about 3 or 4 pounds of the bark and boil in one-half gallon of water until it is reduced to a quart, then strain and add 5 pounds of common brown or yellow sugar; heat again until thoroughly dissolved and it is ready for use. To make imitation maple syrup simply boil the syrup until it is reduced back to sugar again, and when it is made properly the flavor and appearance of the genuine article is obtained.

Artificial Honey.

Clarified sugar	10 pounds.
Pure honey (strained)	3 pounds.
Soft water	3 pints.
Cream tartar	1 drachm.
Essence peppermint	10 drops.

Dissolve the sugar in the water by the aid of gentle heat; take off the scum, and the honey and the cream tartar previously dissolved in a little water; bring to the boiling point, stir well, then let it cool.

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Artificial Lemonade Syrup.

Loaf sugar	2 pounds.
Citric acid	2 ounces.
Concentrated essence of lemon	2 drachms.
Essence of almonds	20 drops.
Hot water	2 pints.

Dissolve the citric acid in hot water, add the sugar, and lastly the lemon and almonds. Stir well, cover with a cloth, and leave until cold. Two table-spoonfuls to a tumbler of cold water will make an excellent drink as refreshing as the best lemonade.

Best Artificial Cider.

Water	25 gallons.
Honey (or fine syrup)	1½ gallons.
Catechu (pure)	6 drachms.
Alum	1½ ounces.
Yeast	½ pint.

Ferment for fifteen days in a warm place, then add:

Bitter almonds	2 ounces.
Cloves	2 ounces.
Whisky	6 pints.
Burnt sugar, to color.	

If acid should be in excess add honey or sugar; if too sweet add cider vinegar to suit the taste.

Genuine New Orleans Mead.

Sarsaparilla root (contused)	8 ounces.
Licorice	8 ounces.
Cassia bark (contused)	8 ounces.
Cloves	2 ounces.
Coriander seeds	3 ounces.
Ginger	8 ounces.

Boil for fifteen minutes in eight gallons of water and let stand till cold to settle down, then strain through a flannel rag, and add to it in the fountain:

Syrup	12 pints.
Honey	4 pints.
Tincture of ginger	4 ounces.
Solution of citric acid	4 ounces.

Add enough water to complete ten gallons, and charge with gas.—*Prof. E. S. Wayne, in Kilner's Formulary.*

Baking Powders.

Pure baking powders are very simple in composition, care being used in preparing them and procuring pure ingredients. According to the advertised statements of the various leading manufacturers we are

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forced to make our own if we desire a pure and wholesome article. As the essential ingredients of the best baking powder are baking soda and cream of tartar we need only be careful in buying of honest grocers or druggists who will guarantee their purity. It is not difficult to procure pure soda, but the cream of tartar is frequently adulterated, and care must be used in its purchase.

It is very important that the materials used must be finely powdered, perfectly dry, and thoroughly mixed. For household purposes a patent sifter is the best to use in mixing. Run the articles through a number of times and free from all lumps. The ingredients can be dried by placing them in an oven for a short time before mixing.

Baking Powder No. 1.

Pure cream of tartar..... 2 pounds.
Pure bicarbonate of soda..... 1 pound.
Corn starch..... 2 ounces.

This is the best that can be made. One to two tea-spoonfuls to a quart of flour.

Baking Powder No. 2.

A cheaper powder, but superior to the majority of powders you will buy, is prepared as follows:

Pure cream of tartar..... 2 pounds.
Pure bicarbonate of soda..... 2 pounds.
Tartaric acid..... 6 ounces.
Corn starch..... 1 pound.
Best flour..... 4 pounds.

Use two tea-spoonfuls to a quart of flower. Do not be afraid of the tartaric acid, as it is harmless. It is best to keep your baking powder in a well-stopped jar or bottle. Flour, terra alba, alum, and chalk are the chief ingredients used in the adulteration of cream of tartar. To determine the admixture of flour rub a few grains of iodine with one ounce of the suspected cream of tartar; if so adulterated a blue tint to the mixture will be produced; or by dissolving a small quantity in water you can prove its presence by the stickiness. Chalk may be determined by its effervescing on the addition of diluted acids; alum by dissolving in hot water and allowing the solution to chrystallize; terra alba and other clays by their insolubility in a hot solution of caustic potassa.

Flavoring Extracts.

The profits to manufacturers and dealers on these household necessities are very large, and the prudent consumer will take advantage of the directions here given. Extracts of lemon and vanilla are most frequently used; nutmeg, mace, cinnamon, etc., are usually used dry by grating.

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Best Lemon Extract.

Best deodorized alcohol..... 1 pint.
Oil of lemon..... 1 ounce.

Cut the peels of two lemons into fine pieces and add to the alcohol and oil of lemon. Let stand for a few days and filter through a felt bag or filtering paper.

Extract of Vanilla.

Extract of vanilla is prepared direct from the vanilla bean. Use care in the purchase of the beans, as there are several varieties. The Mexican vanilla beans have the finest flavor, and the longer the bean, as a rule, the better the extract. There are other excellent varieties of vanilla beans, but they have a somewhat ranker flavor than the Mexican. Unscrupulous jobbers and dealers have been known to soak the whole beans in spirits, practically stealing all their flavor, and then by drying them place them on the market. They can be detected by their light color and brittleness. Most of the vanilla extracts sold for flavoring purposes are adulterated with Tonka beans and other adulterants, some containing not a particle of vanilla.

The following will make a splendid article, and you know what you are getting without paying high prices for weak extracts put up in deceptive little panel bottles. Dishonest manufacturers never yield a point in their efforts to defraud. Not content with the liberty they take with the contents they employ the bottle-makers' art to deceive us in the quantity of the precious stuff:

Vanilla beans..... 1 ounce.
Sugar..... 1 ounce.
Cologne spirits (deodorized alcohol)..... 12 ounces.
Water..... 4 ounces.

Slit the beans and cut them very fine, then mix them with sugar and bruise until moderately fine; then mix with spirits and water and put in a warm place; allow to stand for two weeks (longer the better) shaking every day, and when through filter. Manufacturers color with caramel or other coloring, but for home use this is unnecessary.

To Extract Essential Oils.

To extract essential oils from wood, bark, herbs, etc., put a quantity of the herb or other article into a bottle or jar and pour in a small quantity of ether. Keep in a cool place several hours, and then fill the bottle with cold water. The essential oil will rise to the surface, and may be easily separated.

How to Make Rubber Stamps.

The wording of the desired rubber stamp having been correctly set up in ordinary type, the same is locked up and placed upon a level support. Around it is put an iron frame, which will determine the shape and size of the matrix.

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By means of a soft brush the type as well as all surrounding parts that are to be covered by the plaster of Paris are well oiled.

For the purpose of making the cast finely ground fresh plaster of Paris is needed; if of long standing, the same will lose its desirable properties. This plaster of Paris, of which a sufficient quantity should at one time be mixed to the consistency of pap, using clear water, is poured over the frame containing the type in a thin layer, so as to barely cover it. With a stout brush the mixture is driven into all spaces and interstices, until all details are thoroughly covered. After this the remaining pap of plaster of Paris is added until the frame is full to overflowing. The surface is smoothed down after the plaster has settled somewhat, and in a short while the matrix in the frame may be removed from the type.

After this it becomes necessary to bake the matrix in an oven for a period of from four to six hours. When thoroughly baked the matrix should be well brushed with a thin solution of shellac to impart a smooth surface, and at the same time greater strength,

The matrix at this stage represents a yellowish-white block, in which the lettering appears indented, but in proper place. The indentation corresponds to the height of the letter upon the piece of type or the marks upon a cut, while the remaining parts should be perfectly smooth and free from holes. This matrix, obtained by a coating from the type or cut, will serve as the mould for the final rubber stamp.

Pieces of caoutchouc are cut to the required size and laid upon the matrix. If pressure is now exerted the soft mass will adjust itself to fill all the spaces and reproduce the mould invertedly. Indentations become raised matter, and the whole will show as did primarily the type.

But as the caoutchouc has a tendency to return to its previous shape it becomes necessary to apply the process called vulcanizing. The object is to impart hardness to the rubber, and to prevent its losing the form into which it has been pressed.

To accomplish this the caoutchouc must be heated to a temperature of from 120 to 130 deg. C. As the substance is ordinarily softened by heat it is necessary to take some means to prevent it from sticking to the mould. For the purpose soapstone will answer, and the mould, as well as the piece of caoutchouc, should be well brushed or dusted with this substance.

The duration of the heating varies with the thickness of the rubber sheet. As a general thing from twenty to thirty minutes ought to be sufficient. It may be mentioned here that special apparatus can be purchased for pressing and vulcanizing. The proper vulcanization is of the greatest importance in determining the durability of the stamp.

All that remains to complete the stamps is the mounting of the rubber plate upon a suitable base or handle. This is best done either with zinc or with a solution of caoutchouc in benzine. The surface of the handle, as well as the back part of the stamps, having been covered with such a solution and well pressed together, after drying the entire stamp will be ready for use.—*Amer. Lith. and Printer.*

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Vermin Exterminators.

Phosphorus or Luminous Paste.

This is an unequaled preparation for destroying rats, mice, cockroaches, etc. It attracts them by its luminous appearance and also by its odor, which is very attractive to all vermin. They eat it with great avidity.

Phosphorus	½ ounce.
Armenian bole	1 ounce.
Arsenic	1 ounce.
Oil of rhodium	½ drachm.
Tallow	10 ounces.
Rye flour	12 ounces.
Water	12 ounces.

Cook the flour and water to a thin paste; add the phosphorus—previously melted in a little hot water—and mix; then add the rest and stir until thoroughly mixed.

OTHER METHODS OF DESTROYING RATS.—(1) Mix some fine plaster of Paris with an equal quantity of flour; put the mixture in the place infested by the vermin and a vessel full of water beside it. The rats will devour the mixture and then drink, whereupon the plaster, brought into contact with the water, will become solid and like a stone in their stomachs, which will cause their deaths. (2) When a house is infested with rats which refuse to nibble at toasted cheese or the usual baits, a few drops of oil of rhodium poured on or near the bait will attract them while the most tempting baits fail. (3) Cover the floor near their holes and place into their haunts a quantity of caustic potash. This they lick with their tongues, which makes their mouths sore, and they not only shun this locality, but appear to tell all the neighboring rats about it. (4) Instead of using chloride of lime or potash a quantity of tar can be smeared in and around their haunts and they will disappear. Tar and rats do not agree. If a live rat be caught, smeared with tar, and allowed to escape into the holes he will do the smearing process thoroughly.

Roach and Moth Exterminator.

Thymol	2 parts.
Salicylic acid	2 parts.
Alcohol	200 parts.
Oil of lemon	1 part.

This new, simple, and cheap preparation makes no stain and kills the vermin immediately. The odor is not unpleasant, and is quickly removed by airing the room. Use by sprinkling, or moistening blotting paper with the solution.

Moth Powder.

Lupulin	1 drachm.
Scotch snuff	2 ounces.
Camphor gum	1 ounce.
Black pepper	1 ounce.
Cedar sawdust	4 ounces.

Mix thoroughly and strew among the furs and woolens.

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Bedbug Poison.

Corrosive sublimate (in powder)..... 2 ounces.
Alcohol..... 1 pint.

Apply with a feather or stick into their hiding places. Label poison, and place all such compounds out of the reach of childen.

Poison Fly Paper.

White arsenic..... 1 ounce.
Sugar..... ½ pound.
Concentrated lye..... ½ ounce.
Water..... 1 quart.

Dissolve the concentrated lye in the water, add the sugar and boil the solution, meanwhile gradually adding the arsenic. While still warm dip porous paper (cut into small squares) in the solution and dry them. For use place in plates or saucers partly filled with water where the flies can get at them.

Sticky Fly Paper.

Rosin..... 8 ounces.
Lard or cotton-seed oil..... 3 ounces.

Boil together, spread thinly on manilla paper, place another sheet on top, and when wanted pull them apart and it is ready for use. This is now usually preferred to the poison paper, as the flies are caught and held and do not die and drop into food, etc.

Mosquito and Fly Frightener.

Petrolatum..... 1 ounce.
Paraffine..... ½ ounce.
Oil pennyroyal..... ½ ounce.
Oil of tar..... ½ ounce.
Carbolic acid..... ½ drachm.

Melt the solid ingredients together, and when partly cooled add the other ingredients. This is an elegant preparation to rub on the hands and face where flies, mosquitos, gnats, etc., are troublesome.

Inks.

Late improvements in the manufacture of inks are due to the discovery and cheapening of substances which can be used in preparing them. While good common writing inks are quite easily procured in the market, still they can be manufactured much cheaper by the consumer; and then again there are a variety of special purposes which require inks that are not on sale, and formulas for making them are very valuable. In this collection we give approved and tested formulas for everything in the ink line.

Fine Black Ink.

[FROM LOGWOOD.]

A good black ink can be made by boiling 3 pounds of logwood with sufficient water to leave a residue of 5 quarts. When cold add 3 drachms of yellow bichromate of potash and stir thoroughly. To prevent thick-

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ening add a few drops of solution of mercury salt. It flows freely from the pen, Its color at first is of a dark indigo-blue tint, changing soon into a permanent black. A beautiful gloss may be given to this or any other black ink by adding a strong solution of shellac and borax.

Fine Black Ink.

[FROM ANILINE.]

Black aniline crystals (negrosine)	1½ ounces.
Dextrine	1 ounce.
Corrosive sublimate	5 grains.
Water	2 quarts.

Dissolve the negrosine in a quart of hot water; dissolve the corrosive sublimate and dextrine in the remaining quart, and pour all together. This is a splendid ink, flows freely from the pen, and will keep well.

In making ink use care in buying the best anilines and other ingredients. This is important.

Fine Red Ink.

Eosine aniline	100 grains.
Water	1 pint.

Simply dissolve the aniline in the water. No better bright, fiery red ink can be made.

Fine Violet Ink.

Violet aniline	70 grains.
Alcohol	½ ounce.
Dextrine	½ ounce.
Hot water	1 pint.

Dissolve the aniline in the alcohol and the dextrine in the hot water, and mix them.

Fine Blue Ink.

Water blue aniline	1 drachm.
Dextrine	½ ounce.
Hot water	1 pint.

One-fourth of an ounce of Prussian blue may be used instead of the water blue aniline.

Fine Green Ink.

Green aniline	1 drachm.
Dextrine	½ ounce.
Hot water	1 pint.

Aniline inks of any color can be made in a similar manner. Simply get the desired color of aniline. Maroon ink may be made by mixing equal quantities of black, blue, and red inks; yellow by adding 1½ drachms of picric acid to 1 pint of hot water.

Copying Ink.

Take 1 pint of the violet-black ink and add 1 ounce each of sugar and gum Arabic. This is for what is called moist copying where a press is used. For what is termed dry copying mix about ½ pint of glycerine to a pint of any good black ink. The manuscript, if written on glazed paper, will not dry for hours, and will yield one or two fair, neat, dry copies by simple pressure of the hand. The writing should not be excessively fine nor the strokes uneven or heavy. The copies and the original are neater than when water is used.

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Gaffard's Indestructible Ink.

Lampblack	1 part.
Potash water glass	12 parts.
Aqua ammonia	1 part.
Distilled water	38 parts.

The potash water glass should be of the consistency of syrup.

Hektograph Ink.

(SEE PAGE 1.)

A good purple ink to use on the gelatine copying pad, or hektograph, is prepared as follows:

Methyl violet	1 ounce.
Water	8 ounces.
Glycerine	1 ounce.
Alcohol	½ ounce.

Dissolve the methyl-violet in the water and add the glycerine. Gently warm the solution for an hour, and after cooling add the alcohol.

When black hektograph ink is desired, instead of the methyl-violet use double the amount of negrosine.

White Ink.

An excellent white ink, which can be used with a pen for writing on colored cards or paper, may be made as follows:

Flake white	12 drachms.
Mucilage of gum Arabic	6 drachms.

If too thick add water; if too thin, more mucilage. Shake well while using.

Rubber-Stamp Ink.

Aniline (desired color)	½ ounce.
Glycerine	2 ounces.

Ribbon Ink.

FOR TYPE-WRITERS, DATING STAMPS, ETC.

Aniline	½ ounce.
Alcohol	4 ounces.
Glycerine	7 ounces.
Water	4 ounces.

Dissolve the aniline in the alcohol and add the other ingredients.

Marking Ink.

FOR PACKAGES AND BOXES.

Extract of Logwood	8 ounces.
Bichromate of potash	1 ounce.
Hydrochloric acid	½ ounce.
Dextrine	4 ounces.
Water	½ gallon.

Boil the logwood with the water, add the acid and potash, and lastly the dextrine.

Indelible Ink.

FOR MARKING LINEN, ETC.

Dissolve 5 parts of lunar caustic in 10 parts of spirit of sal ammoniac. Add to the solution 7 parts of pure soda, 5 of gum Arabic, and 12 of water.

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Ink for Writing on Metals.

VALUABLE IN MARKING TOOLS AND INSTRUMENTS.

Muriatic acid..... 1 ounce.
Nitric acid..... ½ ounce.

Cover the portion of metal you wish to write upon with melted beeswax and allow it to cool. Write the inscription plainly with any sharp-pointed instrument through the beeswax to the metal. Apply the acids with a feather or rag, carefully filling each letter, and let it remain from one to thirty minutes, according to the desired depth of the lettering, after which wash off the beeswax and acids and rub over with a little sweet oil to prevent further rust or tarnish.

Ink Powders.

As in the case of fluid inks there are many formulas for preparing ink powders. The following are the best:

BLACK.—Nut-galls, 1 ounce; copperas, ½ ounce; gum Arabic, 7 ounces. Add one clove to to this quantity. Or, take negrosine, 1 ounce; dextrine, 3 ounces; mix.

BLUE.—Water blue aniline, 1 ounce; dextrine, 5 ounces. Or, soluble Prussian blue, ½ ounce; dextrine, 1 ounce.

GREEN.—Aniline green, 44 parts; gelatine, 4 parts, and lunar caustic, 2 parts. Or, green aniline, 1 part; dextrine, 4 parts.

RED.—Eosine aniline, 1 ounce; dextrine, 1 ounce.

A tea-spoonful to a table-spoonful of the powder is dissolved in 1 pint of water, requiring from ½ to 1 hour to make the solution.

Disappearing Ink.

Boil some nut-galls in aqua fortis, and add to the infusion some gum Arabic and a little sulphuric acid. When written on paper this ink is perfectly legible, but will disappear from the paper in a few days.

Invisible Ink.

Invisible inks are those which when first written are not visible, but upon the application of heat or other means the characters are made to appear distinctly. The following are decidedly the best preparations for this purpose:

Oil of vitriol..... 1 fluid ounce.
Soft water..... 1 pint.

This makes a fluid which is perfectly invisible until heat is applied by holding over a lamp or by placing in an oven, when it changes to a permanent black. Write with a clean steel pen. All invisible inks will show on glazed paper, therefore unglased paper should be used.

Another singular invisible ink is made as follows: Oxide of cobalt, ½ ounce; muriatic acid, sufficient to dissolve it; water, 4 ounces; mucilage of gum acacia, 1 drachm. Place in a stained bottle. Characters written with this solution are invisible, but on the application of heat they instantly appear in blue. On cooling they again become invisible.

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Ink Erasing Fluid.

Hydrochloric acid	½ ounce.
Water	1 pint.

Mix, bottle, and label No. 1.

Solution of chlorinated soda	½ pint.
Water	1 pint.

Mix, bottle, and label No. 2.

To erase ink dip the end of a penholder or pencil in No. 1 and apply to the writing, and do the same with No. 2. Let remain a moment and blot off with clean blotting-paper. If the characters are not erased repeat as before.

Cements and Glue.

Armenian Glue.

The jewellers of Turkey, who are mostly Armenians, have a singular method of ornamenting watch cases, etc., with diamonds and other precious stones by simply gluing or cementing them on. The stone is set in gold or silver and the lower part of the metal made flat, or to correspond to that part to which it is to be fixed. It is then warmed gently and the glue applied, which is so very strong that the parts thus cemented never separate. For this glue, which will firmly unite bits of glass and even polished steel, and which may of course be applied to a vast variety of useful purposes, large number of formulas have been published. The following is the original recipe. Dissolve 5 or 6 bits of gum mastic, each the size of a large pea, in as much alcohol as will suffice to render them liquid; in another vessel dissolve as much isinglass, previously softened a little in water (though none of the water must be used), in good brandy or rum as will make a two-ounce vial of very strong glue, adding two small bits of galbanum or ammoniacum, which must be rubbed or ground until they are dissolved. Then mix the whole with a sufficient heat. Keep the glue in a vial closely corked, and when it is to be used set the vial in boiling water. To avoid cracking the vial by exposure to such sudden heat use a thin green glass vial and hold it in the steam for a few seconds before immersing it in the hot water.—*Workshop Receipts.*

Glutina Cement.

FOR GLASS, CHINA, WOOD, LEATHER, ETC.

Gelatine (Cooper's or Cox's)	3 ounces.
Acetic acid	2 ounces.
Carbolic acid	5 grains.
Oil of cloves	6 minims.
Water enough to make	1 pint.

Soak the gelatine in half a pint of water for four hours. Place in a bottle and heat in a water bath; add the acids, dissolve, add the oil of cloves and sufficient hot water to make a pint, and strain.

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To Cement Iron to Iron.

Powdered cast-iron bore chips.....60 parts.
Sal-ammoniac..... 2 parts.
Flowers of sulphur..... 1 part.

Mix, and stir the mixture into a stiff paste by adding water. Use while fresh.

Cementing Metal to Glass, Stone, Etc.

For attaching metal plates, such as metal letters, etc., to flat sheets of glass or windows, the following is excellent:

Copal varnish.....15 parts.
Drying oil..... 5 parts.
Turpentine..... 3 parts.

Melt in a water bath, and add 10 parts of slaked lime. The cement commonly used for fastening the tops on kerosene lamps is plaster of Paris, which is porous, quickly penetrated by the kerosene, and readily destroyed. A cement which does not have this defect is made by boiling 3 parts of resin and 1 of caustic soda in 5 of water. This composition forms a soap, which mix with half its weight of plaster of Paris. Use while fresh.

Pastes.

Paste for Wall-paper, Etc.

Dissolve ½ ounce of salicylic acid in half a gallon of warm water, and when cold stir in as much flour as will bring it to the consistency of cream, being particular to break up all the lumps; next place it on the fire and allow it to cook gently for a few minutes, stirring well meanwhile. This paste answers a variety of purposes. The salicylic acid is to keep it from spoiling. The addition of 1 ounce of powdered colocynth to the above amount will effectually banish all insects and worms from the walls where the paper is pasted.

Paste for Labeling on Tin.

Ordinary pastes will not adhere labels to tin. The following is a good one: Make a paste of gum tragacanth and add a little oil of wintergreen. Apply by removing the film of grease from the tin by a solution of caustic soda (10 parts of water to 1 of soda). Apply with a rag to the spot on which you wish to affix the label.

Paste to Fasten Cloth or Leather on Wooden Surfaces.

Wheat flour.....2½ pounds
Resin (powdered)..... ½ ounce.
Salicylic acid..... ½ ounce.

Rub together till a uniform paste is formed, transfer to a small kettle over a fire, heat, and stir until the lumps are all dissolved and the paste becomes stiff; tranfer to another vessel and cover up. This paste is applied in a thin layer to the surface of the table or desk to be covered, the cloth or leather is then laid on and smoothed with a roller. If leather is to be fastened on it must be first dampened.

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Whitewash and Paints.

Brilliant Stucco Whitewash.

This is a time-tried whitewash, either for inside or outside work, and has been known to retain its brilliancy for over thirty years. Nice unslaked lime, ½ bushel; slake it with boiling water; cover it during the process to keep in the steam. Strain the liquid through a fine sieve or strainer, and add to it ¼ bushel of salt, previously well dissolved in water; rice, 3 pounds—boiled to a thin paste and stirred in boiling hot; Spanish whiting, ½ pound; best glue, 1 pound, which has been previously dissolved by soaking it well, and then hanging it over a slow fire in a small kettle immersed in a larger one filled with water. Now add hot water, 5 gallons, to the mixture, stir well, and let it stand a few days covered from the dirt. It should be put on hot. For this purpose it is best to keep it in a kettle on a portable furnace, or use other means more convenient. It answers as well as oil paint for brick or stone, and is much cheaper.

Coloring matter, dissolved in alcohol, may be put in and made of any shade you like. Spanish brown stirred in will make red-pink, more or less deep, according to quantity. A delicate tinge of this is very pretty for inside walls. Finely pulverized common clay, well mixed with Spanish white, makes reddish stone color. Yellow ochre stirred in makes yellow wash, but chrome goes further, and makes a color generally esteemed prettier. In all these cases the darkness of the shade is of course determined by the quantity of the coloring used. It is difficult to make rules, because tastes differ. It would be best to try experiments on a shingle, and let it dry. Green must not be mixed with lime. The lime destroys the color, and the color has an effect on the whitewash which makes it crack and peel. When inside walls have been badly smoked and you wish to make them a clean, clear white, it is well to squeeze indigo plentifully through a bag into the water you use before it is stirred into the whole mixture; or blue vitriol pulverized and dissolved in boiling water and put into whitewash gives a beautiful blue tint. If a larger quantity than five gallons be wanted the same proportions should be observed.

Durable Paint for Tin Roofs.

Linseed oil	30 parts.
Oil of turpentine	10 parts.
Colcothar	14 parts.
Red chalk	46 parts.

The coloring substances are pulverized and the mixture ground. Should the mixture be too thick reduce it with equal parts of linseed oil and oil of turpentine. Give the roof two coats, allowing the first to dry before applying the second. See that the tin is free from rust, and the coats should not be laid on too thick nor too thin.

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Paint for Roofs.

Pulverized slate (argillaceous schist)..... 35 parts.
Pulverized mica slate (mica schist)..... 30 parts.
Pulverized rosin..... 35 parts.

Mix, and add one-half its volume of pure coal-tar and boil to a fluid mass.

This paint gives a very durable and pliant covering, which does not melt in the greatest heat of summer nor crack or break in the greatest cold. It resists moisture, and a roof painted with it need not be gone over again for four or five years.

Paint for Blackboards.

Common glue, 4 ounces; flour of emery, 3 ounces, and just lampblack enough to give an inky color to the preparation. Dissolve the glue in ¾ quart of warm water, put in the lampblack and emery, stir till there are no lumps, then apply to the board with a woolen rag smoothly rolled. Three coats should be given.

Removing Smell of Paint.

Place a vessel of lighted charcoal in the room and place on it two or three handfuls of juniper berries; shut the windows, chimneys, and doors and twenty-four hours afterward the room may be opened, when it will be found that the sickly, unwholesome smell will be gone. Another very simple method is to plunge a handful of hay into a pail of water and let it stand in the newly-painted room.

Paint Remover.

To remove dry paint or hard putty make a saturated solution of caustic of potassa with water. Apply to the paint with a swab. After a short time it will be easily removed.

Staining Wood.

Ebonizing Wood.

Logwood chips..... 8 ounces.
Copperas..... ½ ounce.
Lampblack..... ½ ounce.
Water, sufficient.

Boil the logwood for 30 minutes in a gallon of water, and then add the copperas and lampblack. Apply to the wood hot, giving a number of coats. In varnishing ebonized wood a little drop black must be added to the varnish or it will give a brown shade.

Staining Wood Rose Color.

A brilliant and uniform rose color can be imparted to wood and vegetable ivory by chemical precipitation, as follows: The first bath consists of 8 parts of potassium iodide to 100 parts of water. The second bath is prepared by mixing 2½ parts of corrosive sublimate with 100

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parts of water. Immerse the wood for a few hours in the first bath, then place it in the second, in which it will acquire a beautiful rose color. Varnish the wood after drying. Both baths can be repeatedly used without renewing them.

Imitation of Cedar.

Mix 2 parts by weight of catechu, 1 part of caustic soda, and 100 of water. The best wood to use is white wood, and after the article is finished it is boiled in the stain for several hours, rinsed, and dried. The length of time in boiling depends upon the depth of color desired. This is a very deep and natural stain.

Hard Coating for Wood.

To coat wood with a substance as hard as stone apply the following mixture while hot with a brush:

Lime	40 parts.
Resin	50 parts.
Linseed oil	4 parts.

Metal and Glass Secrets.

Hardening Composition for Steel.

Spermaceti oil	95 quarts.
Melted tallow	20 pounds.
Neat's foot oil	4½ quarts.
Pitch	1 pound.
Rosin	3 pounds.

Melt the rosin and pitch together, add the other ingredients, and heat all in an iron vessel until all moisture is driven out, and the heated mass ignites from a burning chip of wood held over it; the flame is at once extinguished by a close-fitting lid.

In using the method for saw blades, they are first heated in a suitable furnace and then placed vertically, teeth upward, in troughs filled with the mixture. After sufficient cooling they are taken out and wiped with a piece of leather so that only a slight film of fat remains. They are then placed flat over a coal fire until the coating of fat ignites, which may burn as freely as required for great hardness. Screws, or other articles which require a less degree of hardness, are dipped into the hot mixture and brought to a white heat.

Composition to Toughen Steel.

Resin	2 pounds.
Tallow	2 pounds.
Black pitch	1 pound.

Melt together and dip the steel in the mixture when hot.

To Soften Iron or Steel.

Anoint the article all over with tallow, temper it in a gentle charcoal fire, and let it cool itself; or take a little clay, cover your iron with it, and temper in a charcoal fire.

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Restoring Burnt Steel.

It is not generally known that burnt steel may be almost instantaneously restored by plunging it while hot in cold water and hammering it with light strokes on the anvil, turning it so as to hammer all over it, again dipping in the cold water, and repeating the hammering process as before. Try again if you do not succeed the first time.

Welding Cast-Steel.

Rock saltpeter..... ½ pound.
Oil vitriol..... ½ pound.
Water.....1 gallon.

Dissolve the saltpeter in the vitriol and add it to the water. After scarfing the steel get it hot; and quench in the preparation. Then weld the same as a piece of iron, hammering it very quickly with light blows. It answers the purpose much better than borax. Cork it in a bottle and it will keep for years.

Another:

Borax.....15 parts.
Sal-ammoniac..... 2 parts.
Cyanide of potassium..... 2 parts.

Dissolve all in water, and evaporate the water at a low temperature.

To Drill Hardened Steel.

Cover your steel with melted beeswax, and when cold make a hole in the wax with a fine-pointed needle or other article the size of the hole you require; put a drop of strong nitric acid upon it, and after an hour rinse off and apply again. It will gradually eat through.

To Drill Holes in Cast-Iron.

By means of carbolic acid a hole ¼ of an inch in diameter has been drilled through ½ inch thickness of cast-iron with a carpenter's brace.

To Solder Ferrules for Tool Handles.

Take your ferrule, lap round the "joining" a small piece of brass wire, then wet the ferrule, scatter on the joining ground borax, put it on the end of a wire, and hold it in the fire till the brass fuses. It will fill up the joining and form a perfect solder. It may afterward be turned in the lathe.

Soldering Without a Soldering Iron.

Cut a piece of a tin-foil the size of the surface to be soldered, then pass over the surface a solution of sal-ammoniac, place the tin-foil between the pieces, and heat over a lamp or fire until the foil melts. Instead of the solution of sal-ammoniac equal parts of water and hydrochloric acid saturated with zinc can be used just as well.

To Clean Gun-barrels from Lead.

Pour in a little mercury, agitate it over the interior surface of the barrel, and pour it out again. The mercury will amalgamate the lead and remove it,

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To Re-sharpen Old Files.

Saleratus..... 4 ounces.
Water..... 1 quart.

Dissolve the saleratus in the water. Boil the old files or rasps in this solution for half an hour. Then take out, wash, and dry them. Next stand them in a jar, filling it up with rain water and sulphuric acid in the proportion of water, 1 quart; sulphuric acid, 4 ounces. Coarse files should remain in the bath twelve hours and fine ones two or three hours less. Take them out, wash them clean, dry quickly and thoroughly, and rub them with sweet oil to prevent rusting.

Another method, though not so effectual, is to pour a few drops of benzole upon the file and brush thoroughly with a scratch brush.

Mending Tinware by Candle Heat.

This is such a simple and cheap way of mending tinware that a person with just a bit of ingenuity can do his own work in this line. Take a vial about two-thirds full of muriatic acid and put into it little bits of sheet zinc as long as the acid will dissolve them. Then put in a crumb of sal-ammoniac and fill up with water and it is ready for use. Wet the cork in the vial and with it wet the edges of the place to be mended. Then put a piece of sheet zinc over the hole and hold a lighted candle or spirit lamp under the place, which melts the solder on the tin and causes the zinc to adhere without further trouble. Do not forget to wet the zinc also with the solution.

A Good Way to Sharpen Razors.

Put the razor blade for half an hour in water to which has been added one-twentieth of its weight of muriatic or sulphuric acid, and after a few hours "set" it on a hone. The acid acts as a whetstone by corroding the whole surface uniformly.

Razor-Strop Paste.

Moisten flour of emery with tallow or sweet oil.

Cutting Ovals and Different Shapes on Glass.

Scratch the glass around the shape you desire with the corner of a file or graver; then having bent a piece of wire the same shape heat it red-hot and lay it upon the scratch, and sink the glass into cold water just deep enough for the water to come almost on a level with its upper surface. It rarely fails to break perfectly true.

Etching on Glass.

Barium sulphate..... 3 ounces.
Ammonia fluoride..... 1 ounce.

Acid sulphuric, a sufficient quantity to decompose the ammonia fluoride and maxing the mixture of a semi-fluid consistency. It must be prepared in a leaden vessel. It can be used with a common pen, but must be kept in bottles coated inside with paraffine, beeswax, or gutta-percha, with rubber stoppers.

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To Drill and Ornament Glass.

Any hard steel tool will cut glass with great facility when kept freely wet with camphor dissolved in turpentine. A drill-bow may be used, or even the hand alone. A hole bored may be readily enlarged by a round file. The ragged edges of glass vessels may also be thus easily smoothed by a flat file. Flat window glass can readily be sawed by a watch-spring saw by aid of this solution. In short, the most brittle glass can be wrought almost as easily as brass by the use of cutting-tools kept constantly moist with camphorized oil of turpentine.

Plating Without a Battery.

Silver-Plating Solution.

Nitrate of silver (crystals)	½ ounce.
Cyanuret potassa	½ ounce.
Prepared Spanish whiting	1 ounce.
Pure rain water	2½ ounces.

Mix all together in a glass vessel, and it is ready for use. Thoroughly clean the article from all grease and dirt (see polishing preparations, page 12), and apply with a soft rag or brush and polish with a chamois skin.

Silvering Powder.

Chloride of silver	1 ounce.
Pearlash	3 ounces.
Common salt	1½ ounces.
Whiting	1 ounce.

Powder and mix the articles thoroughly. This is excellent in silvering brass and copper articles. Clean the surface of the article, as in the preceding preparation, and apply the mixture by rubbing on with a cork or piece of soft leather moistened with water and dipped in the powder. Afterward the metal should be well washed in hot water and wiped dry.

Gold-Plating Solution.

Gold amalgam	½ ounce.
Nitro muriatic acid	1 ounce.
Alcohol	2 ounces.

Dissolve the amalgam in the acid and then add the alcohol. Thoroughly clean the article to be plated and apply the solution with a soft brush. Rinse and dry in sawdust or with tissue paper and polish with chamois skin.

Nickeling Iron Without Electricity.

To a solution of chloride of zinc 5 or 10 per cent strong add enough nickel salt to give the usual color of nickel bath. Cleanse the articles and put them in the solution for from ½ to 1 hour.

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Gold and Silver Imitations.

Imitation Gold.

An American has discovered a beautiful alloy, which has been most successfully applied as a substitute for gold. It is composed of pure copper, 100 parts; pure tin, 17 parts; magnesia, 6 parts; tartar of commerce, 9 parts; sal-ammoniac, 3.6 parts, and quicklime, 1.6 parts. The copper is first melted, then the lime, magnesia, sal-ammoniac, and tartar are added, little at a time, and the whole is briskly stirred for about half an hour, so as to mix thoroughly, after which the tin is thrown on the surface in small grains, stirring until entirely fused. The crucible is now covered and the fusion kept up for about thirty-five minutes, when the dross is skimmed off, and the alloy found ready for use. It is quite maleable and ductile, and may be drawn, stamped, chased, beaten into powder, or into leaves, like gold leaf, in all of which conditions it is not distinguishable from gold even by good judges, except by its inferior weight.

Imitation Silver.

Combine by fusion 1 part pure copper, 24 parts block tin, 1½ parts pure antimony, ½ part pure bismuth, and 2 parts clear glass. The glass may be omitted save in cases where it is an object to have the metal sonorous.

Care of Teeth, Mouth, and Breath.

The teeth, through negligence and ignorance, receive less attention among the majority of people than any other subject of a personal character. The care of children's teeth is very important, and if parents do not post themselves in the matter frequent visits to a skilled dentist should in their case be imperatively enforced, as well as upon the older members of the family.

The first teeth of the infant are called the diciduous or *milk* teeth, and are twenty in number—ten in each jaw. These twenty teeth are as follows: Eight incisors, four in each jaw—the four being composed of two central and two lateral incisors—also four canine or cuspid teeth, two in each jaw, and eight molars, four in each jaw—the molars being called first and second molars, indicating their relative positions as well as the periods of their eruption (commonly called cutting). It is generally recognized among physicians that all diseases of children are more difficult to treat during dentition than before or after. It is well enough for parents to recognize this fact in administering medicines to their children. Although the time of eruptions of the teeth differ with different persons, yet the following table gives a close approximation:

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ERUPTION OF THE TEETH.

Deciduous Teeth. (The lower generally precede the upper by two or three months.)		*Permanent Teeth.*	
Central incisors	5 to 8 months	First molars	5 to 6 years
Lateral incisors	7 to 10 months	Central incisors	6 to 8 years
First molars	12 to 16 months	Lateral incisors	7 to 9 years
Canines	15 to 20 months	First bicuspids	9 to 10 years
Second molars	20 to 36 months	Second bicuspids	10 to 11 years
		Canines	11 to 12 years
		Second molars	12 to 14 years
		Third molars	17 to 21 years

It would be difficult indeed to condense in so short a space so much practical information from a reliable source as has been given in the following prize essay on the teeth, which was awarded by the Dental Society of Philadelphia:

1st. Cleanse your teeth once, or oftener, every day. Rinse the mouth after eating. Cleansing the teeth consists in removing every particle of foreign matter from around the teeth and gums.

2d. To cleanse use well-made brushes, soft quill, or wood toothpicks, an antacid styptic tooth wash, and precipitated chalk. If these means fail apply to a regular dentist.

3d. Avoid eating hot food. Thoroughly masticate the food, and well salivate it before swallowing.

4th. Parents ought to carefully attend to the child's second dentition. Prevail upon your children to visit, at frequent intervals, a careful and skillful operator.

5th. Remember that four of the permanent double teeth come in at the age of six years. They are very liable to decay early, are very large, and should never be allowed to require extracting.

6th. Never allow any one to extract a tooth or dissuade you from having them filled unless absolutely necessary.

7th. Carelessness and proscrastination are responsible for a large proportion of teeth that are lost.

The teeth were never intended to take the place of nut-crackers nor to rival scissors in cutting thread. The teeth must be taken care of or your health will suffer.

Remember, a clean tooth would not decay in a hundred years.

Best Tooth Powder.

Precipitated chalk	4 ounces.
Powdered cuttle-bone	2 ounces.
Powdered orris root	1½ ounces.
Powdered borax	¼ ounce.
Oil of cloves	5 minims.
Oil of wintergreen	2 fluid drachms.

Mix the powder thoroughly, and with a small portion add the oils and mix them until in the form of a moist powder. Then add the rest of the mixed powders gradually until all are evenly distributed throughout. A solution of carmine can be added in with the oils, which will color it as desired.

Some prefer a preparation in the form of a paste, as follows:

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Cherry Tooth Paste.

Precipitated chalk	½ ounces.
Powdered areca nut	1 ounce.
Powdered quillaya bark (or soap root)	½ ounce.
Powdered cuttle-bone	1 ounce.
Powdered borax	½ ounce.
Powdered orris root	½ ounces.
Tincture of myrrh	½ ounce.
Oils of nutmeg, cloves, and bitter almonds, each	15 minims.
Oil of rose	5 minims.

Honey, glycerine, and mucilage acacia equal quantities of each sufficient to make into a paste of the desired consistence. First mix the powders and color with carmine, and then add the other ingredients and thoroughly mix.

Mouth washes are a valuable addition to the toilet as they assist to harden and heal the gums, cleanse the mouth and purify the breath.

Antiseptic Tooth Wash.

Salicylic acid	12 parts.
Alcohol (95 per cent)	315 parts.
Distilled water	60 parts.
Oil of wintergreen	15 parts.
Essence of orange flowers	15 parts.

Color with tincture of cochineal. A few drops of carbolic acid may be added to the above in the case of decayed teeth and foul breath.

When the breath is very offensive the following should be taken in addition to rinsing the mouth with the mouth wash:

Solution for the Breath.

Solution chloride soda	1 ounce.
Liquor potassa	1 ounce.
Phosphate soda	½ ounce.
Water	8 ounces.

Mix and take one-half tea-spoonful in water after each meal.

When the services of a dentist are not at hand and the teeth are badly decayed and aching, the following mouth wash is recommended. It is used by holding a tea-spoonful in the mouth as long as possible and spitting out:

Spanish camomile root	4½ drachms.
Sal-ammoniac	2½ drachms.
Vinegar and lavender water, each	2½ fluid ounces.

Cut the camomile in pieces and rub fine with the sal-ammoniac; add the lavender water and vinegar by placing all in a glass flask and let it digest for twelve hours and filter.

The following preparation is one of the best for relieving toothache until a dentist can be consulted:

Toothache Drops.

Chloral hydrate	1 drachm.
Camphor	1 drachm.
Morphia sulphate	2 drachms.
Oil peppermint	2 drachms.

Rub the solids in a mortar until they liquefy, then add the oil of peppermint. Apply on cotton.

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Removal of Freckles, Moles, Etc.

The following practical treatise on this much-abused subject is copied from the *B. & C. Druggist*, and although originally written in the interests of druggists it is of more value to persons affected with these blemishes; hence we reproduce the essay in its entirety with the formulas stripped of their technical terms and phrases:

At this time of the year there are few questions which are more frequently addressed to the "family chemist," and fewer still to which he ordinarily gives so unsatisfactory a reply, as, "What shall I do to cure my freckles?"

Knowing as we do how greatly the popularity—*i. e.*, the business prosperity—of the majority of our friends depends upon the votes and interest of their lady customers, we have been at some pains to lay before them such an amount of practical information upon the above subject as will enable them to retain the good will and material gratitude of their fair interrogators on the one hand, and to put a little extra profit in their own pockets on the other.

We do not propose to convert these pages into an elaborate treatise upon the skin; but for the benefit of those who are only just commencing business it will, perhaps, be as well to make a few observations which our more experienced friends may consider of the "leather and prunella" order. In the first place it will be generally admitted that upon the subject of our present notes there is no published information of a practical and reliable character, and that medical writers and practitioners either shun the question altogether or approach it in a perfunctory manner, and leave it very much where they found it. For our present purpose the cutaneous discoloration commonly designated by the term "freckles" may be considered under two heads—the so-called "summer" or temporary variety (*ephelis*), and the permanent kind (*lentigo*). Both are commonly stated to be simply morbid alterations of the skin-pigment, and to be situated solely in the *rete mucosum*, but this is not absolutely true, inasmuch as *ephelis*, properly so called, is generally due to a darkening of the under surface of the epidermis either in small ovoid patches ("summer freckles") or extended over a large surface ("tan" or "sunburn"), while with *lentigo* the brownish discolorations are at a greater depth, and remain *in situ* after the covering epidermis has been completely removed. Strong sunshine, or any powerfully actinic light, and radiant heat from any source are apt to produce the first named, and to enhance the latter form of the skin's chromatogenous function, the manifestations of which vary greatly according to individual idiosyncrasies.

Similarly the treatment which answers best for some persons is not so efficacious in other cases, but the old, old adage that "prevention is better than cure" applies here with considerable force, and as regards the *rationale* of remedial applications, it may be said in general terms that the application, in the right place, of active reducing, or deoxidiz-

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ing, agents is as a rule successful in removing *ephelis* altogether, and in greatly toning down the shade of *lentigo*. Commencing with the mildest form we will give a good formula for a

SUNBURN LOTION.

Citric acid	1 drachm.
Sulphate of iron (pure)	18 grains.
Elder-flowder water	3 ounces.
Camphor, sufficient quantity.	

The sulphate of iron must be in clear green crystals, unless the "granulated" form, which is preferable, be available, and in either case the salt should be fresh and free from oxidized portions, or "rustiness;" it should be dissolved in half the elder-flower water (all of which is better, if not quite recently distilled, for being quickly raised to the boiling point and cooled out of contact of air before use), the citric acid being also in solution in the other half, and the two fluids mixed, filtered if necessary, and bottled immediately, a lump of camphor about the size of small peppercorn to be added to the contents of each bottle,

WASH FOR THE SKIN.

Hydokinine	48 grains.
Glacial phosphoric acid	30 grains.
Glycerine	2 drachms.
Distilled water	6 ounces.
Mix.	

The two lotions are stated to give excellent results, especially the latter. They are to be applied to the skin of the face, etc., in the usual way, at least twice in the course of twenty-four hours, after it has been washed and dried carefully. If the skin be of the nature known as "greasy," a preliminary wash with tepid water containing a few drops of stronger water of ammonia is advisable.

ALBADERMINE.

Under this empirical title a process of removing "tan" and the milder variety of "freckles," a foreign surgeon has devised the following:

SOLUTION A.

Iodide potassa	2 drachms.
Pure iodine	6 grains.
Glycerine	3 drachms.
Infusion of rose leaves	4 ounces.

Dissolve the iodide of potassium in a small quantity of the infusion and a drachm of the glycerine; with this fluid moisten the iodine in a glass mortar and rub it down, gradually adding more liquid until complete solution has been obtained; then stir in the remainder of the ingredients, and bottle the mixture.

SOLUTION B.

Hyposulphate of soda	1½ ounce.
Rose water	1 pint.
Dissolve and filter.	

With a small camel's hair pencil or piece of fine sponge apply a little

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of "Albadermine A" to the tanned or freckled surface, until a slight but tolerably uniform brownish-yellow skin has been produced. At the expiration of fifteen or twenty minutes moisten a piece of cambric, lint, or soft rag with "B" and lay it upon the affected part, removing, squeezing away the liquid, soaking it afresh, and again applying until the iodine stain has disappeared. Repeat the entire process thrice daily, but diminish the frequency of the application if tenderness be produced. In the course of from three or four days to as many weeks the freckles will either have disappeared entirely or their intensity will be very greatly diminished. "Summer freckles" yield very speedily to this treatment.

ANTI-FRECKLE LOTION.

Corrosive sublimate	12 grains.
Hydrochloric acid (pure)	3 drachms.
Kernels of bitter almonds	1½ ounces.
Glycerine	1 ounce.
Tincture benzoin	2 drachms.
Orange-flower water, sufficient quantity.	

Dissolve the corrosive sublimate in three ounces of the orange-flower water, add the hydrochloric acid, and set aside. Blanch the bitter almonds and bruise them in a Wedgwood mortar, adding thereto the glycerine and using the pestle vigorously; a smooth paste is thus obtained. Then add gradually about nine ounces of the orange-flower water, stirring constantly, continuing this operation until a fine, creamy emulsion is the result. Subject this to violent agitation—preferably with the aid of a mechanical egg whisk—and allow the tincture of benzoin to fall into it the while drop by drop. Then add the mercurial solution, filter, and make up the whole to the measure of one imperial pint (20 ounces) with more orange-flower water.

This preparation is recommended to us by an eminent dermatologist as being invariably efficacious in the treatment of *ephelis*, and always greatly ameliorating *lentigo*, even if it does not entirely decolorize the patches in the latter case. A general whitening of the skin is produced by this lotion without any irritation. It is as well, however, not to apply it to any abraded surfaces. It has been found far superior in practice to a preparation—which it somewhat resembles—sold at a high price in Paris under the name of *Lait Antiphelique*.

BISMUTH OINTMENT FOR FRECKLES.

Subnitrate of bismuth	3 drachms.
Simple ointment	2 ounces.

Apply to the face, etc., at night, and remove in the morning with a little cold cream previous to washing. This is from a private American source.

COPPER OLEATE FOR FRECKLES, ETC.

This is a much more effective and reliable ointment for the purpose than the preceding, which is really only suited for the milder form of sunburn, while the oleate of copper will remove the more persistent and obstinate *lentigo*. It is thus prepared·

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Oleate of copper..... 1 ounce.
Petrolatum..... 3 ounces.
Mix.

This is to be applied in the same manner as the preceding, washing the the surface of the skin, however (after the cold cream), about every third morning, with a little weak ammonia water, in order to prevent any inadvertent accumulation of copper.

Several of the preceding are well adapted for the treatment of very dark-colored and deep-seated examples of *lentigo*, of which, however, some seem capable of resisting all treatment of this kind. The only method of reaching these is by the complete removal of the epidermis of the part and of the upper portion of the *cutis* also. A Turkish bath is often useful as a preliminary for an effort of this kind, which, of course, needs the application or some disorganizing substance. Permanganate of potassium answers in this direction, but we find that a moderately strong solution of Mr. H. B. Condy's new disinfectant—permanganate of aluminum—is undoubtedly the best of the two for this purpose. It should be applied several times until the skin has acquired a uniform brown tint. At from one to twelve hours after this is noticed it should be removed by a warm and dilute solution (about 8 or 10 per cent) of hydrochloric acid, to which a little glycerine may be added to prevent too rapid drying. Still better, however, is nitric acid, which if "painted" upon a colored spot of this kind first renders it more distinctly yellow, then orange-brown. In a day or two this becomes a deeper brown, and more or less disorganized, cracking, either round the edge, or right across the center, so that it can be readily peeled away. Freckles removed in this manner seldom crop up again, in that particular place, at all events. In this connection it is a somewhat curious fact that whereas *dilute* nitric acid often caused soreness and irritation when applied in this manner, a stronger acid does nothing of the kind, but quietly and quickly "deadens" that portion of the outer covering it has been applied to, so that in a day or two it can be removed quite painlessly. What is known as "French nitric acid," of from 1.330 to 1.350 specific gravity, is very appropriate for this purpose.

COCAINE AND NITRIC ACID FOR MOLES, ETC.

The removal of either deep-seated freckles or moles is, as before hinted, not always an easy task, but nitric acid is perhaps about as good an agent for the purpose as any other. The mole should be surrounded by a little "cell" or ring of wax, so that the acid can be applied direct without fear of disorganizing the adjacent skin. As, however, nitric acid by itself sometimes occasions a good deal of smarting, etc., when applied, it is better to avoid this by mixing cocaine with it. The mixture given below answers the purpose very well indeed:

Nitric acid..... 1 drachm.
Cocaine..... 6 grains.

This should be kept ready for use in a small bottle with a good-fitting stopper. The end of a glass rod dipped in and then cautiously applied to the surface of the mole or freckle, the process being repeated once or

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twice a day, and the unsightly spot has its vitality destroyed without pain, being then easily and effectually removed.

Preparation for Red Noses.

This formula was procured from a friend of the author residing at Little Rock, Ark. I can vouch for its efficacy in his case, as it removed the unnatural color in a few days, and he told me that others had tried it with equally gratifying results. It is translated from a formula of a young physician, a graduate of Jefferson Medical College:

Oxide of zinc	½ ounce.
Corrosive sublimate	2 grains.
Sulphur (precip.)	½ ounce.
Glycerine	½ ounce.
Calamine	3 drachms.
Rose water, sufficient to make 8 ounces.	

Mix and apply with a small, soft sponge. The medical works say little about the red nose. The cause is usually attributed to drinking, but gluttony, tight lacing, nasal catarrh, chronic enlargement of the tonsils, exposure to strong sunlight, etc., all contribute to a reddening of the nasal organ.

Other Toilet Preparations.

The following formula, prescribed by the late Dr. Tilbury Fox, is a very soothing application, and is a great favorite with ladies who have flushed faces:

Calamine Face Lotion.

Levigated calamine	120 grains.
Oxide of zinc	60 grains.
Glycerine	60 drops.
Rose water, sufficient to make 3 ounces.	

Be sure and get the white calamine, and not the red. Apply with a small, soft sponge and allow to dry on, the excess of powder being lightly dusted off with a soft cloth.

Lotion for Chapped Hands, Face, and Lips.

Glycerine	3 drachms.
Strained honey	1 drachm.
Cologne	1 drachm.
Oil of bitter almonds	3 drops.
Alcohol	4 ounces.
Water	1½ ounces.

Mix and apply with a soft sponge while the skin is damp, and wipe dry with a towel. This is the best preparation of its class.

Lip Salve.

For healing and softening the lips, preventing them from cracking, etc., the following is an elegant preparation:

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Petrolatum	2 ounces.
White wax, or paraffine	½ ounce.
Tannin	½ drachm.
Oils of lavender and bergamot, each	½ drachm.
Oil of rose geranium	½ drachm.

Melt the petrolatum and wax together and add the tannin while cooling; add the oils and stir until cold. When it is desired to color the lips add 20 grains of carmine. This is done by reducing the carmine to a fine powder in a mortar and rub with a small portion of the salve until it is thoroughly incorporated, and then mix the remainder gradually.

Pimple Lotion.

Carbolic acid	½ drachm.
Borax	2 drachms.
Glycerine	1 ounce.
Tannin	1 drachm.
Alcohol	1½ ounces.
Rose water	5 ounces.

Mix and dissolve. Apply night and morning.

Manicure Powder.

This is used for polishing and cleaning the nails:

Powdered pumice stone	4 ounces.
Powdered French chalk	½ ounce.
Carmine (No. 40) in powder	½ drachm.
Bulk perfume (violet or rose)	½ ounce.

Manicure Salve.

This is for softening the nails, curing hang-nails, etc.:

Petrolatum	1 ounce.
Powdered castile soap	2 drachms.
Oil of bergamot	15 drops.

Mix thoroughly and apply upon going to bed, wearing a pair of gloves.

Best Bay Rum.

Oil of bay leaves	4 fluid drachms.
Oil of pimenta	30 minims.
Oil of bergamot	60 minims.
Acetic ether	30 minims.
Concentrated lye	4 drachms.
Deodorized alcohol	7 pints.
Water	9 pints.
Color sufficient with grass green.	

Mix the oils and dissolve them in the alcohol; to this gradually add the lye, previously dissolved in the water, then add the acetic ether and coloring matter, and let stand a few days and filter through a glass funnel into a glass vessel.

Fine Rose Water.

Oil of rose	15 drops.
White sugar	½ ounce.
Carbonate of magnesia	2 drachms
Water	2 pints.
Alcohol	2 ounces.

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Add the oil to the alcohol, rub with magnesia and sugar, then add the water and filter.

Hoyt's German Cologne.

Oil of bergamot	1 ounce.
Oil of Neroli	½ ounce.
Oil of lemon	1 ounce.
Oil of sandal wood	½ ounce.
Camphor	20 grains.
Deodorized alcohol	7 pints.
Rose water	1 pint.

Mix, let stand 30 days, and then filter.

Hair Tonic.

Tincture red cinchona	3 ounces.
Glycerine	1½ ounces.
Jamaica rum	1 ounce.
Tannic acid	½ drachm.
Tincture cantharides	2 drachms
Tincture capsicum	1 drachm.
Cologne, sufficient to make 9 ounces.	

Apply once or twice a day, rubbing well into the scalp.

Clifford's Shampoo Compound.

Borax	3 ounces.
Salts of tartar	1 ounce.

Mix, and dissolve 1 ounce of the mixture in 1 pint of water when wanted for use.

Quillaya Sea Foam.

Tincture of quillaya	1 ounce.
Bay rum	1 ounce.
Water	6 ounces.

This is much better than the old form containing ammonia.

Cream Hair Oil.

Pure winter-strained lard oil	2 ounces.
Strong solution of borax	2 ounces.

Perfume with bergamot or any desired odor. This makes an elegant, creamy preparation, and is one of the best that can be made. The addition of ¼ ounce of tincture of cantharides to the above amount will stop the hair from falling out and assist Nature in supplying new hair. A great many persons are prejudiced against hair oils, but they have been used for ages, and will continue to be used. Some hair actually demands oil, owing to a lack of that supplied by nature.

Pomade Hair-Grower.

Petrolatum	½ pound.
Tincture cantharides	½ ounce.
Oil of cinnamon	15 minims.
Oil of bergomot	60 minims.
Oil of citronella	30 minims.
Oil of cloves	5 minims.

Melt the petrolatum and add the tincture of cantharides, and while cooling add the other ingredients.

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Perspiration Powder.

Salicylic acid.....15 grains.
Carbolic acid.....10 drops.
Burnt alum (powdered).....1 drachm.
Starch (powdered).....2 ounces.
French chalk (powdered).....1 ounce.
Oil of lemon.....20 drops.

Mix thoroughly, and apply by dusting the powder into the stockings and gloves.

Corn and Wart Salve.

Caustic soda or potassa.....1 ounce.
Water.....1 ounce.
Starch (powdered).....½ ounce.
Glycerine.....2 ounces.

Mix the starch with the glycerine, heat, and stir until thoroughly incorporated. Dissolve the potassa in the water heated to a boiling point and add the other mixture to it. This preparation needs to be applied only once or twice. Spread a little of the salve on the corn, bunion, or wart. Do not touch the healthy skin. Allow it to remain several hours and then soak the part in warm water.

German Corn-Killer.

A very popular liquid preparation for removing corns, etc., is prepared as follows:

Salicylic acid.....½ drachm.
Extract of Indian hemp.....8 grains.
Collodion.....½ ounce.

Apply once a day to the hard skin by means of a small brush.

Chilblains.

In the treatment of chilblains we give a detailed list of formulas from the works and practice of a number of the most eminent physicians and surgeons.

OINTMENT TO BE USED AT NIGHT.

Dr. Bartholow's prescription is as follows:

Carbolic acid.....1 drachm.
Tincture of iodine.....2 drachms.
Tannic acid.....2 drachms.
Simple cerate.....4 ounce.

POWDER TO PREVENT CHILBLAINS.

Dr. Bandt gives the following prescription:

Sodium borate.....3 parts.
Alum and benzoin, each.....2 parts.
Mustard.....12 parts.
Orris root and bran, each.....10 parts.
Almond-skins.....30 parts.

Mix with a little water and apply.

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WASH FOR NON-ULCERATED CHILBLAINS.

Dr. Beasley's prescription is as follows:

Sulphate of aluminum and potash..... 1 part.
Vinegar and weak alcohol, of each.....25 parts.

Dissolve and filter. Apply night and morning.

OINTMENT FOR NON-ULCERATED CHILBAINS.

Dr. Giacomini's prescription is as follows:

Prepared lard..... 8 parts.
Chrystallized acetate of lead..... 1 part.
Distilled cherry laurel water..... 2 parts.

Mix, and apply night and morning.

FOR UNBROKEN CHILBLAINS.

Sulphuric acid..... 1 drachm.
Spirits of turpentine..... 1 drachm.
Olive oil..... 3 drachms.

Mix the oil and turpentine first, then gradually add the acid. Apply by rubbing on two or three times a day.

FOR UNBROKEN CHILBLAINS.

Lard..... 4 ounces.
Turpentine..... 1 ounce.
Camphor..... 2 ounces.
Oil of rosemary.....15 drops.

Rub in with continued friction.

FOR BROKEN CHILBLAINS.

Yellow wax.....
Olive oil..... } of each, 3 ounces.
Camphorated oil.....
Goulard's extract..... 1½ ounces.

Melt the wax with the oil, then add the camphorated oil and Goulard extract.

How to Make an Incubator.

[*From Scientific American Supplement.*]

Experiments with the incubator here given have been made all over the country. It is one that is in actual use, and has always given satisfaction. Having secured permission from the originator, we here illustrate it for the benefit of our readers.

To make this incubator get your tinner to make you a tank 15 inches wide, 30 inches long, and 12 inches deep, of galvanized iron or zinc, the iron being preferable. On the top should be a tube 1 inch in diameter and 8 inches high. In front should be another tube, 9 inches long, to which should be attached a spigot, as illustrated in Fig. 2. Having made your tank, have what is called the ventilator made, which is a box with a bottom but no top. The ventilator should be 8 inches deep, and 1 inch smaller all round than the tank, as the tank must rest on inch

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boards. In the ventilator should be four or six tin tubes ½ inch in diameter and 6 inches long. They should extend through the bottom, so as to admit air from below, and to within 2 inches of the top or a little less. Now make an egg drawer, which is a frame of wood 3 inches deep having no top or bottom, except that the front should be boxed off

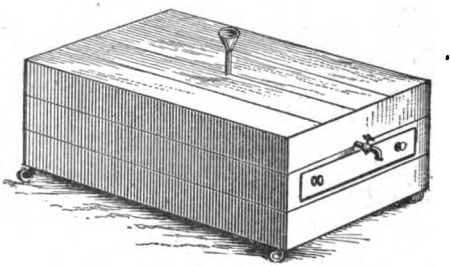

FIG. 1.—THE HOT-WATER INCUBATOR.

and filled with sawdust, which is covered over afterward with a piece of muslin to keep the sawdust from spilling. This box in front of the drawer exactly fits the opening in Fig. 3, when the drawer is in its place. Of course the egg drawer must be made longer than the tank and ventilator, in order to allow for this space which it fills in the opening, which

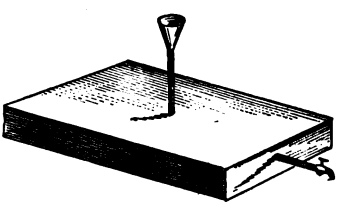

FIG. 2.—THE TANK.

Observe that the tubes on the top and the spigot are quite long, in order that they may extend through the packing of sawdust which is to surround it. This tank is to have a close-fitting covering (top and sides) of wood, to resist pressure of water. The bottom is not to be covered.

is the packing all around the incubator. The bottom of the egg drawer should be made by nailing a few slats lengthwise to the under side, or rather, fitting them in nicely, and over the slats in the inside of the drawer a piece of thick, strong muslin should be tightly drawn. On this muslin the eggs are placed, in the same position as if laid in a hen's nest, and it allows the air to pass through to the eggs for ventilation.

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The eggs can be turned by hand, marked for designation, or an egg turner may be made by fastening slats crosswise to one on each side running lengthwise, something like a window lattice, and when the eggs are placed between these slots by merely pushing the frame the eggs will turn over, exactly on the same principle that an egg will roll when it is

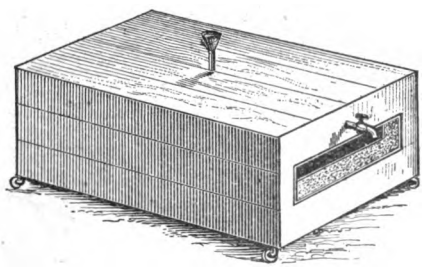

FIG. 3.—DRAWER OPENING.

Shows the thick packing, which is noticed at the opening. This extends all around. The front of the egg drawer (Fig. 4) fits in its place in order to complete the surrounding packing, when the incubator is closed, as at Fig. 1.

pushed by a block, a book, or anything else; but we believe the method is patented, and do not advise infringement.

Having prepared the tank, let it be covered with a box, but the box must not have any bottom. This is to protect the tank against pressure

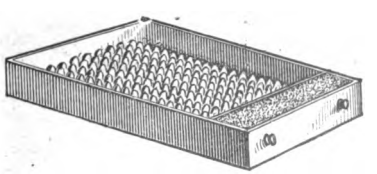

FIG. 4.—THE EGG DRAWER.

The space just in front of the eggs is the portion partitioned off to fit in the opening at Fig. 3. The egg drawer is therefore LONGER *than the tank and ventilator.*

of water on the sides, and to assist in retaining heat. Such being done, place your ventilator first, egg drawer next, and tank last. Now place a support under the tank and the box, or have them rest on rods, and as the weight of water will be great in the center, the iron rods should be placed crosswise under the tank every 6 inches. Now fasten the three apartments (ventilator, egg drawer, and tank) together, with boards

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nailed to the sides and back and front (of course leaving the opening for the egg drawer), care being taken to drive no nails in the egg drawer, as it must move in and out, and should have a strong strip to rest on for that purpose. Having completed these preparations make a larger box to go over all three, so that there will be a space on the sides,

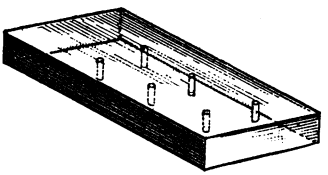

FIG. 5.—THE VENTILATOR.

The tubes admit air from below, which passes into the egg drawer above through the muslin bottom of the egg drawer to the eggs. The eggs rest upon the muslin, which is tightly drawn over narrow slats running lengthwise the bottom of the drawer.

back, front, and on top; but as the ventilator must be filled with sawdust to within 1 nch of the top of the tubes, it serves for the bottom packing. Make the outer box so that there will be room for filling all around the inside box with sawdust, and also on top, being careful to let the tube for pouring in the water come through, as also the spigot in

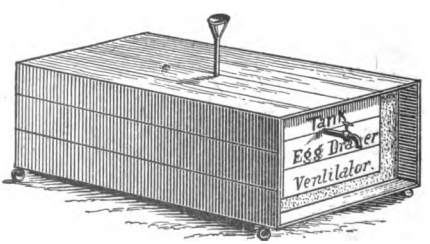

FIG. 6.

Here we remove the front of the incubator in order to show the positions of the ventilator, egg drawer, and tank. First the ventilator, then the egg drawer (which of course should be longer than the others in order to fit in the opening shown at Fig. 3, but which we did not do here in order to mark the places), and on the top is the tank. When the front is completed the incubator is seen at Fig. 1.

front. About 4 inches or so thickness of sawdust is sufficient, according to preference. The front of the incubator must be packed also, but an idea of how it should be done may be earned by observing the open-

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ing in Fig. 3, which is so constructed that the box in front of the egg drawer (Fig. 4) exactly fits into it, and completes the packing when the drawer is shut. The incubator should be raised from the floor about an inch, when completed, to allow the air to pass under and thence into the ventilator tubes.

The incubator being complete, the tank is filled with boiling water. It must remain untouched for twenty-four hours, as it requires time during which to heat completely through. As it will heat slowly, it will also cool slowly. Let it cool down to 120 deg., and then put in the eggs, or, what is better, run it without eggs for a day or two in order to learn it and notice its variation. When the eggs are put in, the drawer will cool down some. All that is required then is to add about a bucket or so of water once or twice a day, but be careful about endeavoring to get up heat suddenly, as the heat does not rise for five hours after the additional bucket of water is added. The tank radiates the heat down on the eggs, there being nothing between the iron bottom of the tank and the eggs, for the wood over and around the tank does not extend across the *bottom* of the tank. The cool air comes from below in the ventilator pipes, passing through the muslin bottom of the egg drawer to the eggs. The 15x30-inch tank incubator holds 100 eggs if turned by hand, but less if the eggs are placed between slats. Lay the eggs in the same as in a nest—promiscuously.

DIRECTIONS.

Keep the heat inside the egg drawer as near 103 deg. as possible; the third week at 104 deg. Avoid opening the egg drawer frequently, as it allows too much escape of heat. *Be sure your thermometer records correctly*, as half the failures are due to incorrect thermometers, and not one in twenty is correct. Place the bulb of the thermometer even with the top of the eggs, that is, when the thermometer is lying down in the drawer. The upper end should be slightly raised, so as to allow the mercury to rise, but the bulb and eggs should be of the same heat, as the figures record the heat in the bulb and not in the tube. Keep a pie pan filled with water in the ventilator for moisture and keep two or three moist sponges in the egg drawer, displacing a few eggs for the purpose. Turn the eggs half way round twice a day at regular intervals. Let the eggs cool down for fifteen minutes once every day, but do not let them cool lower than 70 deg. No sprinkling is required if the sponges are kept moist. If the heat gets up to 110 deg. or as low as 60 deg. for a little while it is not necessarily fatal. Too much heat is more prevalent than too little. A week's practice in operating the incubator will surprise one how simple the work is. The tank will be troublesome to fill at first, but the matter will be easy after it is done, as it can be kept hot. Heat the water in two or more boilers, as a large quantity will be required, and pour it in through the tube on top of the incubator boiling hot, using a funnel in the tube for the purpose. Just at the time of hatching out do not be tempted to frequently open the drawer. Cold draughts are fatal. Patience must be exercised.

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BROODERS.

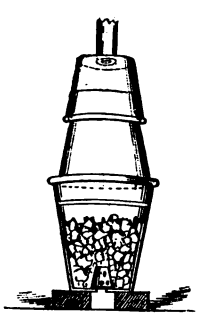
An excellent brooder may be made with a tank of hot water, covered well, the same as the incubator. A piece of muslin or woolen cloth should be next the bottom to prevent burning the chicks. Keep the heat among the chicks at about 90 deg. Let the tank rest on inch boards with no opening under it, but in front; a fringe should hang in front for the chicks to run in and out under the tank. A little yard may be constructed of glass sash, something like a hot-bed. Feed the chicks four or five times a day, at first on hard-boiled eggs, chopped fine, giving them also a little milk, fine screenings, and millet seed. After they are a week old feed anything they can eat, but never feed meal in a raw state, as it should be scalded first. Keep a little sand, fine gravel, and bone-meal within reach of them all the time, and see that they are always dry, clean, and warm. Do not crowd them, as the fewer the number together the better, and never have different ages together.

This incubator will hatch chicks, ducks, turkeys, or guineas, and we see no reason why it should not hatch the egg of the ostrich or anything else as well. Chicks hatched by incubators, if rightly cared for, do better than with hens, and are stronger and more vigorous.

We have endeavored here to embody all the answers to questions that we suppose may be asked. Should you be in doubt, read the directions carefully again. We trust that with the help of our illustrations our readers will have no difficulties in the way.—*The Poultry Keeper.*

A Cheap Charcoal Stove.

I saw the other day at a friend's house one of the simplest and most effective stoves for a small conservatory it is possible to imagine. It was composed of three 12-inch ordinary flower pots. The hole at the bottom of the lowest was covered with a small pot, into the sides of which had been bored a number of holes. The pot was then three parts filled with charcoal, and lighted from the top. This is the furnace. It is covered by pots Nos. 2 and 3, and a light tin funnel and chimney carry off the vapor. The draught is maintained by placing the apparatus on a couple of bricks, and regulated by closing the intervening space with mud, leaving only a sufficient aperture to keep the fire burning. This improvised stove will burn without attention for twenty-four hours, and it is amazing what a great amount of heat is given off from so small a surface.—*S. J., in the Gardener's Chronicle.*



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Preservative Compounds.

Within a few years some valuable methods of keeping meats, fish, oysters, fruits, fruit juices, milk, butter, etc., in a healthful, nutritious, and palatable condition for a considerable time past the ordinary period of their decay have been discovered. In the following treatise we give the results of the most patient research in securing all the latest and most valuable information in regard to this important subject.

We will not deal with processes which necessitate complicated apparatus or which require almost impossible chemical combinations, but we will explain inventions which have undoubted value combined with as much simplicity in the preparation as the circumstances will permit.

Of all the anti-septic agents used for the purposes mentioned boracic acid is the favorite, and salicylic acid next in choice. Various other anti-septic agents are used and combined in different ways, according to the results of experiments. They are applied either by immersion, coating, injecting, vapors, etc., according to specified instructions.

Prof. Frederic S. Barff of Kilburn, England, it seems was the first to combine boracic acid with glycerine, and to produce a preservative compound known as boroglyceride, which is soluble in water and alcohol. As boracic acid is but slightly soluble in water and other common solvents this combination with glycerine—which is also a useful agent in arresting the growth of germs—is peculiarly valuable. It is tasteless and inodorous and imparts no disagreeable taste or odor to the substance being treated. Solutions of the compound may be applied to the preservation of all organic substances, either animal or vegetable. The process was patented in England in 1881 and in the United States in 1882.

To prepare boroglyceride, glycerine is heated to near its boiling point and boracic acid added until it ceases to be dissolved, the proportions being about 92 parts by weight of glycerine to 62 parts by weight of boracic acid in chrystals. Maintain the mixture to a temperature of about 200 deg. centigrade as long as water is given off. When the mass cools it becomes a yellowish, transparent, glacial substance, tough and deliquescent. This dissolves in water, but when boiled in large quantities of the same it is decomposed into glycerine and boracic acid. In order to to employ the compound prepare a solution either in water, alcohol, or other suitable solvent and immerse in or impregnate with such solutions the organic substances to be operated upon. Solutions may be prepared of various degrees of strength, but it has been found that a solution consisting of 1 part by weight of the compound and 40 parts by weight of water will give good results; but other desired proportions may be adopted.

Prof. Barff, the inventor of the boroglyceride process, read a paper before the Royal Society of Arts, London, in regard to his method of preserving food. The date of the reading is not at hand, but it is sup-

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posed to be slightly prior to May 13, 1882, on which date it was printed in the *Scientific American Supplement*. Although quite lengthy the paper contains so much interesting data and light upon the subject that we reproduce it almost entirely, together with remarks by other eminent gentlemen who were present at the meeting:

"This evening I have on the table specimens of food which have been kept for longer or shorter periods, as they are intended to illustrate various applications of this preserving material. As you know oysters are imported very largely in tins. They are cooked at a high temperature and hermetically sealed. The high temperature to which they are exposed necessarily causes a loss of flavor, and it is generally remarked that tinned oysters are not a success. * * * I have oysters on the table which were opened on the 3d of December in last year. I will ask you to taste them and see in what condition they are, and I would also remind you that they have not been kept in hermetically sealed tins, but simply in corked or stoppered bottles; hence this method of preserving oysters is cheaper than the other, and I maintain that it is more effective, because thiir natural and fresh flavor is preserved. I am informed by a friend in Jamaica that he has sent me some Jamaica oysters and other things—I trust they will be here in time for me to submit them to you this evening.

"Another substance, the perfect preservation of which is very important, is cream, both for home use and for exportation. Cream in London costs from four to five shillings per quart; it can be bought in country places for two shillings, and even for less. This preservative substance will keep cream for months perfectly good and sweet, having its full flavor; so that it would be quite possible to send it in quantities from the country, and its sale need not be pressed as it need not be used immediately. I have regularly every week, except during the holidays, brought with me from Beaumont College, near Windsor, where I lecture, a quart of cream treated with one ounce of the boroglyceride; it has always kept perfectly good even in the hottest weather. I have done this for a year and a half; a near relative has taken the greater part of this regularly for the time stated, and this proves conclusively that there is nothing at all injurious to health in the compound. I see a gentleman present here to-night who is connected with that college as a professor of natual science, and he will, in the discussion, be able to give you very valuable information as to the material and as to its perfect wholesomeness. Last month I sent some cream to the Rev. J. Ryan, a Jesuit priest in Jamaica, and I have received a letter from him, from which I will read you an extract:

'26 NORTH STREET, KINGSTON, JAMAICA,
'February 24, 1882.

'The cream which you sent was used by eight of us in coffee, and was pronounced to be wonderfully good. Next morning it was taken in preference to a beaten egg, by the captain of H. M. S. Tenedos, to his coffee,'

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"Last year I sent some Devonshire clotted cream, which I prepared myself, to Zanzibar, on the east coast of Africa. The climate here is very hot; fresh food will only keep a few hours. This cream had to pass through the hot climate of the Red Sea. I will read an extract from a letter written by a lady who received the cream:

'UNIVERSITIES MISSION TO CENTRAL AFRICA,
'MBWENI, ZANZIBAR, March 8, 1881.

'The Devonshire cream you sent us was quite a success. I received it last night. Fortunately the Bishop and Miss A—— came to Mbweni, to-day, so we had it for dinner. That I might have everything correct I opened a pot of raspberry jam which we had from London a long time ago. The Bishop said it had kept perfectly, but had not quite the rich flavor that it has when quite fresh; he has been used to it in Devonshire. Every one pronounced it most excellent. We sent some in to Mrs. H——, and were surprised at her sending for more, for she seldom eats half anything we send her. She did not know what it was, but she said she had never had anything here she enjoyed so much.'

'A year ago I sent some cream from Beaumont College dairy to the Rev. Thomas Porter, the head of the Jesuit Mission in the West Indies, He states that the cream was as good as any he had eaten at home, that he gave it to several strangers to eat, and that they would not believe that it came from England. These experiments and these testimonies prove conclusively that this compound will preserve cream. I shall this evening show you specimens. It is easy to send cream in good condition to the tropics. A great objection to condensed milk is that it is always too sweet. The boroglyceride will preserve condensed milk, and will give t no flavor at all. My friend, the Rev. Thomas Porter, sent me some articles preserved with the material which, I sent him from England. They arrived about June in last year. Some raw, fresh turtle came quite fresh. It was cooked and eaten by several persons, who said it was quite fresh and good, and had the flavor of fresh turtle. At my own house I had turtle cutlets fried; they were perfectly good, and tasted like turtle. Another article which Father Porter sent me was an uncooked Jamaica pigeon; it was roasted at Beaumont College. I divided it and brought half of it home It was tasted by twelve people, who all pronounced that it was perfectly good, and had the true pigeon flavor. In the same parcel came some green sugar-cane, fresh tamarinds taken direct from the tree, fresh limes, and the juices of two different fruits. All were fresh, and were tasted by gentlemen who had lived in Jamaica, who all declared that they had all their own peculiar flavors. On the 3d of September, 1881, another box was sent me from Jamaica, containing sugar-cane, guavas, fresh ginger, and turtle; the turtle had come to grief, because it was not properly treated on the other side; the cane, guavas, and fresh ginger have been tasted by those who have lived in Jamaica, and have been pronounced to have their true flavors.

Ordinary milk cannot be kept good for a long time, especially in hot weather. If milk were concentrated in this country, and heated with

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the boroglyceride, carriage would be saved, and the milk might be kept good and fresh for a fortnight and more; all it would require would be to reduce it again to its original strength. If fresh milk be treated with this preservative it can be set for cream for several days, even in hot weather. The cream which rises will keep, and the skim-milk will remain sweet for several weeks; this I have tried in the dairy at Beaumont College. From the cream so prepared butter was made, and was kept for several weeks without a particle of salt, and was eaten by members of the college. I also wish to show another method by which meat can be preserved and cheaply transported. In South America, about Buenos Ayres and the River Platte, many cattle are killed simply for the hides and fat; the flesh is thrown away. Now, if this flesh were cut up in small pieces, and put into the preserving liquid for a night, it would, even in that hot climate, keep good for some time. It could then in a few hours be dried in the sun, packed in casks, and sent to this or to other countries. I have a specimen of beef treated in this way. It was put into the solution on Jan. 19, 1882, dried Feb. 1, and has lately, within a few days, been boiled, and here is the resulting beef tea, which has not in any way been flavored. I have also small quantities of beef juice here preserved in bottles. The juice was expressed and has been kept raw. Raw beef and mutton juice is recommended by medical men in many conditions of the digestive system. I administered it to a near relation for six weeks, and the juice was preserved good by my material. In the case referred to the effect was very satisfactory. It appears to me to be a most important matter that soup meat, and meat for potting and stewing, should be sent to this country in the way I propose. The supply would be large, the prices low, and the profits highly satisfactory, and it would greatly relieve the meat market, because a very large quantity of fresh meat which is now used for soup could be employed in other ways. It has been remarked to me: 'But would you get people to use it?' I think, to begin with, that if proprietors of hotels and heads of large public institutions, workhouses, and hospitals could be shown that for half the cost they could have equally good soup and soup stock, they would willingly use it, and from thence it would come into private use. I have specimens to show the effect of boroglyceride on fish. Here are sprats which have been kept for a year; they are dry, but perfectly good and eatable; also some preserved fresh since Jan. 13, 1882. You will be able to judge of their appearance and flavor. I have also herrings and a piece of skate which have been preserved for the same time. If fishmongers had a tank of this solution they could, at the end of the day, put their fish in it, and take them out when required. Bloaters, when lightly cured in hot weather, do not keep good many days; if a small quantity of this stuff was used with the salt, they would keep good for months. The same may be said of smoked salmon. That which is very salt costs 9d per pound, but the mild cured kinds cost 3s. 6d. to 4s. per pound. All could be mildly cured if this material was used with the other curing substances. As an adjunct in curing mild hams and bacon

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it would be of great use, for these, when cured lightly, would not go bad, as they often do in the summer time. What I have said as to the temporary preservation of fish by fishmongers applies equally to the preservation of meat and fowls by butchers and poulterers.

"It is justly complained of that the Australian cooked meat is overcooked. If it were for a short time dropped in this preservative solution it would keep perfectly well after being lightly cooked, even underdone. I have a piece of beef which was dipped Feb. 28 and boiled on March 9. It has been left in its own liquid, it was not flavored, and no salt was added. Here, too, is a vast field for the application of the process. Here is also lobster which was taken out of the shell Feb. 1, and here are two lobsters in their shell which were immersed on the same day.

"I now wish to draw your attention to a parcel from Jamaica, which has just arrived, and from which I am able, I am happy to say, to show you specimens which must be of interest. In a jar on the table is some fresh turtle, which I had simply cooked. I thought it better so to present it to you rather than raw. There is also a Jamaica pigeon, also just cooked here, and a *vol au vent*, which I have had made from oysters which were sent open in the preserving stuff from Jamaica. These specimens will prove conclusively that food sent from a tropical climate retains its freshness and delicate flavor. I have reserved one of the pigeons raw, that you may see in what state it arrived. Some mutton was shipped to me from the Falkland Islands at the beginning of last August; a piece of it is uncooked on the table. I have also had a piece stewed, which you will be able to taste this has of course passed the tropics. Through the kindness of my friend Mr. Haffenden of the 'Andaluzia,' in the Strand, who owns vineyards in the southwest of Spain, I can show you some perfectly fresh sardines which he had placed in the preserving fluid several months ago in Spain, and which he brought with him. You will yourselves judge of their condition; I will only remark that they have the peculiar fragrance of that delicate fish, and will it not be a boon to have a supply of this fresh delicacy at a moderate cost?

"You will also see, and I hope taste, a pigeon pie. The pigeons and the steak have been preserved raw in stoppered bottles since the 21st of last November and the eggs since the 4th of July, 1881. I will also call your attention to a tongue which I myself placed in the solution Feb. 9 in this year, with some garlic, sugar, and juniper berries, my object being to show that salt can, if desired, be dispensed with. You will doubtless find that it will require salt; but you will readily infer that hams, tongues, etc., can be made just as salt as one pleases, and will yet keep perfectly sweet, in fact sounder, than those cured only with salt. This tongue was boiled out of pickle. I exhibit two shoulders of mutton, one cooked, the other raw; they are from sheep killed Jan. 10, 1882. Also a piece of beef preserved on the same day; this when you have inspected it shall be cut in slices and broiled. You will see some sausages,

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both cooked and uncooked; they were made for me by Mr. Bowron, poulterer, of Paddington, early in July last, before I went to Carlsbad. I took some with me to that place, and they were there eaten and pronounced good. These are some of the same lot; they were made as follows: The meat was chopped, put into the preserving fluid for one night, and then mixed with the other material in the ordinary way. They have been kept since in an earthenware jar; they have, therefore, been made more than nine months. I may remark that the bread in these sausages was not treated, and therefore it has become slightly sour, but the pork has kept perfectly fresh. I have also some other sausages which I bought Jan. 12, and at once preserved; these having been steeped, the bread has not turned in the slightest degree sour.

"Mock turtle soup, bought ready made from a confectioner's shop in Oxford street, Jan. 25, treated with the preservative stuff, has remained quite good and unchanged in flavor.

"There is also a specimen of gravy soup made in October last, and some vermicelli soup made about three weeks ago. The preservative action of boroglyceride in cooked foods is, it seems to me, of great importance to hotel-keepers, confectioners, and restaurant proprietors, as it will enable them to buy large stocks when certain articles are cheap, and from the specimen I show of cooked beef you see it remains quite moist, as it can be kept, without getting sour, in its own gravy and under a layer of its own fat. To prove that articles can be kept and dried without losing their flavor, I had some partridges treated and dried last February twelvemonth, and I exhibit some soup made from two of these birds. The other articles on the table are one raw and one roast fowl, bought Jan. 17; one raw and one roast pheasant, bought Feb. 5; one rabbit boiled, bought Jan. 17. There are also from Jamaica a green lime, some fresh tamarinds, and some pieces of fresh ginger. * * *

"I thank you, ladies and gentlemen, for the patient hearing you have given me."

DISCUSSION.

The Chairman said the paper was marked by the clear and philosophic way in which the subject was treated, and before inviting discussion upon it he would mention shortly his own experience of the process, the only interest of which was that it was quite independent of Prof. Barff. When he was asked to take the chair he communicated with Mr. Barff, and inquired what the process was. Mr. Barff kindly sent him a specimen of this substance, which he melted, and put some of it into one-half of a pint of cream. The other half very soon turned sour, and had to be thrown away, but that to which the substance was added was perfectly fresh that morning. He was confirmed in the opinion of its freshness by the cook, though she said there was a very slight tartness perceptible, by which she could distinguish it from fresh cream. He had also tried another experiment on meat which was chopped very fine, and divided into two parts; to one part he added merely tepid water, to the other, tepid water to which one-sixteenth

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of its bulk of this compound had been added. This was left on the meat for eighteen hours, and then filtered off through muslin. Several days ago the portion which had no preservative was very offensive, but the other portion was that morning perfectly free from any odor whatever.

The Rev. J. L. Dobson said he had had the pleasure of being associated with Mr. Barff in most of the experiments he had detailed, and might therefore anticipate his reply to one or two points raised by Dr. Graham. An experiment which was tried for some time in a large school would answer the question of wholesomeness. At the Beaumont College, Windsor, there was a large staff of teachers and over 200 pupils, and during the hot weather of last summer the dairymaid was very much annoyed at the milk turning sour, and applied to him to see if he could do anything to counteract it. He handed her some 14 or 15 lbs. of this material, and during the whole of the hot weather and well on into September it was constantly used, and the milk was preserved; but the method was not detected by any one, either by the younger members or by those who might be expected to be more critical. No ill effects were observed by the medical officer or by individuals. From his own experience he thought the aroma was very well preserved throughout. For instance, in oysters which had been preserved over three months there was the characteristic aroma of the fresh oyster; mutton could be easily distinguished from beef, and the peculiar smell of the turtle was also very distinct. They had not yet tried beer with so much fullness as other articles, but about nine months ago a small quantity was treated and left exposed to the air, with only a loose stopper of cotton wool. It did not grow cloudy in the ordinary way, but owing to the severity of the experiment, and perhaps to not sufficiently treating it, after four months it lost all flavor, became extremely flat, and a slight fungus appeared.

Dr. Thudichum had listened with great pleasure to the paper, and had no doubt if the application of the invention could be effected on a large scale it would be very useful. He had some experience with regard to a portion of the ingredients used, viz.: boracic acid, though he had none of this beautiful new compound. It might not be known to the meeting that boracic acid had been used for a great many years for preserving food, and in fact many of them in summer time had their milk well dosed with it. It had been sold to milkmen in London for years under the name of "aseptin." He had tested it in 1865 and found a great many of those effects which Mr. Barff described. For instance eggs were beautifully preserved, and steak immersed in the solution did not become either mouldy or decomposed, but on the contrary appeared to retain its flavor. A variety of other things, such as cheese and cream, were for a long time preserved by this application of aseptin. He hoped the addition of the glycerine would increase the power and prevent some drawbacks which would otherwise stand in the way of boracic acid alone as a preservative of raw or cooked meat.

Prof. Barff, in reply to the various questions which had been asked,

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said he had used salicylic acid and had found it useful in preserving food, but for several reasons discontinued further investigations, one being on the score of its unwholesomeness, and he found that his views on that point had been borne out by the action taken by the French Government. Dr. Graham had asked him about flavor; he had given Dr. Graham a few days ago some specimens of preserved fish, which he said had lost their flavor, but that would not be found to be the case with the box of sardines. The herrings had been kept in an open vessel exposed to the air ever since the day they were put into the liquid, and therefore it was not surprising that they had lost their flavor. If they would try any of the things which had been tinned, not soldered up, but such as the Jamaica pigeons, which were in a common corked bottle, it would be found that the aroma and flavor were retained. The only thing requisite was to keep the vessel so as to exclude the air, as you would with tea or coffee. Dr. Thudichum made some very interesting remarks which there was not time to refer to at length, if he were competent to do so, but not being a medical man he could not enter into medical questions. As to the wholesomeness of the compound, however, he might say that he had taken large quantities of it himself and it had never done him any harm; and a near relative had taken an ounce per week regularly for a year and a half, without any ill effect—a person, too, not very strong or of good digestive powers. The boys and teachers of Beaumont College drank milk preserved with it without distinguishing the taste or suffering any ill effects. He knew there were medical opinions in favor of boracic acid, and one physician he was acquainted with used it as a medicine. If it were at all unwholesome he certainly should not recommend it, but he did not think there was the slightest fear. As to boron getting into the system, it was not boron which was used, but oxide of boron; but even if it did—and he should not be surprised if traces of boron were found in the excreta—it did not follow that any harm was done. There were many things which went through the system without injury; for instance, silica, of which most people took a great deal in the twenty-four hours. As to the cost of the process the cost per gallon, as far as he could tell—he could not tell exactly—would be under 1s.—perhaps 8d. or 9d.—and a gallon would affect an enormous quantity. Most of the articles on the table were put into one pan of solution, and the cost of the whole stuff was about 9½d. Should the process be adopted commercially experiments as to the cost would be most carefully made and the results published. A joint of any size could be soaked; the only thing was to give it plenty of time. You might soak a piece of beef of twenty pounds, forty pounds, or fifty pounds; or you might use an injecting syringe, such as butchers employed for salting meat quickly, and the meat so treated would keep for a week or a fortnight perfectly good, but he did not think it would keep well enough to pass under a tropical sun. In order to do that you must inject by the aorta, by means of a force pump, so as to send the liquid into all the interstices of the flesh. As to the proportions, 1 in 20 was the strongest he used, and 1 in 60 the weakest; for preserving meat 1 in

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50 answered perfectly well—1 lb. of the compound added to 50 lbs. of water. The bottle should be put before the fire until melted, and then poured into hot water, and it would dissolve. With regard to preserving morbid specimens he thought it would answer perfectly well. He had had some practice in morbid anatomy, and he might say that, for the injection of bodies to be used for anatomical purposes it would keep them perfectly sweet. It should be injected by the aorta in the usual way before injecting with the red wax. In reply to Mr. Dipnall he would say that the compound penetrated right through into the innermost parts of the meat. If you had an earthen pan and put into it 1 lb. of this and 50 lbs. of water, and placed in it a joint which came home on the Saturday night in hot weather, you could take it out the next day and it would keep perfectly for a fortnight. Of course it took time to penetrate into the meat, but the first superficial penetration stopped the injurious effects of germs which set up putrefaction. Another important fact was this: if you had a roast leg of lamb, perfectly good, but did not eat it all, and put it away in hot weather, it would turn sour, but if it had been treated in this way it would not; it would keep for six months without going sour. By adding a small quantity from time to time, which you could only learn by experience, the bath would keep perfectly fresh and effective, though it would be found after a time to get rather dark colored. That arose from the juice of the meat, and the advantage of this process was that you need not throw it away, as you must brine, but could boil it down into very good soup. In conclusion he would only ask his hearers to read the paper and discussion carefully when published, and he was sure any one would be able to carry out the process.

The Chairman, in proposing a hearty vote of thanks to Prof. Barff, said the process he had described was remarkable for its great simplicity and the ease with which it could be carried out. Any cook could readily apply it.

The vote of thanks was carried unanimously.

An Improved Boracic Acid-Glycerine Compound.

The following is the invention of an American, William S. Fickett of Rochester, N. Y., and is an improved process of combining boracic acid with glycerine for preservative purposes. (Patent No. 285,350.)

"My invention consists in a new mode of producing a new preservative compound from boracic acid and glycerine, as hereinafter described. Heretofore by one method* such a compound has been produced from these ingredients by heating glycerine to near its boiling point and adding boracic acid until it ceases to be dissolved, and maintaining that mixture to a temperature of 200 deg. centigrade as long as water is given off, etc.

"Now my process consists in taking equal quantities of glycerine and crystallized boracic acid, placing the same in a closed or sealed vessel,

*Doubtless the Barff process—[author.

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and then applying heat at about 300 deg. Fahrenheit for about two hours, which causes the boracic acid to dissolve and blend with the glycerine. On cooling it forms without loss of weight into on opalescent semi-solid, freely soluble in cold water, entirely devoid of bitter or metallic taste, and communicating no objectionable taste to butter or like delicate foods. When thus produced it is an unfailing preventive of fermentation and decay in animal and vegetable matter or fluid compounds."

The following is a different process of using boracic acid, and explains itself:

James Howard, Philadelphia, Pa.; composition for preserving foods. (Patent No. 276,246.)

"I have discovered a method of obtaining a chemical compound of boracic acid for the production of which neither solution nor the employment of heat is necessary, the salt being formed by the union of the component substances in a dry state, so that the difficulties of solution and of loss through volitization is avoided. Moreover the compound has anti-septic properties distinct from those of the acid, due to one of the other elements thereof, and is tasteless.

"I take preferably not less than 5 parts by weight of pure boracic acid in crystals, and add thereto 1 part of pure phosphate of soda. The ingredients are mixed together dry, in a mill or other suitable grinding apparatus, and as the chemical reaction between them progresses the whole, or practically the whole, of the acid crystals lose their structure, and the mass can be ground until it assumes a pasty or doughy condition. The result is boro-phosphate of soda, containing more or less free boracic acid, according to the excess thereof used above the proportions given. The moisture yielded by the chemical reaction is evaporated at the ordinary temperature by exposure to the air without loss of boracic acid, and the dry amorphous salt thus produced is readily ground. It may be used either as a dry powder or may be dissolved in water and applied in the usual modes to the substances to be preserved. If desired other substances, such as salt and saltpeter, may be added to the boro-phosphate compound, and the whole mixed thoroughly by regrinding."

Preservation of Butter, Lard, Etc.

The following process is the invention of Mr. William Pitt Clotworthy. (Patent No. 284,184.)

The process consists of incorporating with the fat, which may consist of butter, lard, or other grease, a sufficient amount of paraffine. Paraffine is non-oxidizable, without taste or odor, and, as the inventor claims, it is perfectly harmless when used in this manner, just as beeswax is swallowed with honey, although not in such large proportion. Tons of paraffine are manufactured yearly into chewing gum and chewed harmlessly by thousands.

In preserving butter the process is as follows: Take 1 ounce of fresh unsalted butter and incorporate with it 1 ounce of paraffine, and thus

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orm a jelly, and then thoroughly mix this amount of jelly with 1 pound of butter.

In preserving lard combine the paraffine as follows: When the lard is ready to be drawn off from the rendering kettles, and while still hot, add 1 ounce of paraffine to each pound of lard and stir the mass thoroughly.

Compound for Preserving Food.

Theodore L. Corwin of Marathon, N. Y., has invented the following. (Patent No. 253,983):

The invention relates to the class of compounds used to preserve in a healthful state such articles of food as meats, fish, milk, eggs, butter, oysters, cider, and also to be used as a disinfectant and to arrest putrefaction.

"I take of nitrate of potassium, of salicylic acid, and of chloride of sodium, each 1 ounce. These should all be in powder and dissolved in 1 quart of water. Then add 1 drachm of hydrochloric acid previously diluted with 1 ounce of water. To preserve meat immerse for twenty minutes in the hot solution, after which let it drain for one hour; then pack in a well-closed vessel. For the preservation of fish use the same as for meat, only the solution should be allowed to become cold before using. To keep oysters stir into them 3 ounces of the solution (cold) to each gallon of oysters. Cider will be kept sweet if there is added to each barrel 1 quart of the solution immediately after the cider comes from the press. Milk to be kept sweet should have the powder first named, viz.: nitrate of potassium, salicylic acid, and chloride of sodium, each 1 ounce, added to every 16 gallons. As a disinfectant the solution should be sprinkled freely around the place or places to be disinfected. To prevent putrefaction the solution should be copiously applied to the object treated."

Fruit-Juice Preservatives.

An Ohio inventor has patented a process for preserving fruit juices, such as cider, wine, etc., which he says, if treated according to his directions, will keep unchanged for years:

"The juice is taken before fermentation takes place and boiled, all scum is carefully skimmed off, and then the liquid, while still hot, is filtered through a compound of partially pulverized charcoal, crushed mustard seed, and ground sassafras root. The filter should be covered with fine woven wire, outside of which should be fastened a flannel cloth to catch all escaping sediment. To every gallon of juice to be filtered there is placed in the filter 2 ounces of charcoal, 2 scruples of crushed mustard seed, and 6 drachms of ground sassafras root. After filtering it is again boiled, and if any scum or impurities appear on the surface they are removed, when the juice is to be bottled, corked tightly, and should be left for one year."

Schaumberg & Dillon's method of preserving fruit juices consists in bottling and sealing the juices, and then heating the bottles to 170 deg·

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Fahrenheit for thirty-five minutes. The juices are put in bottles and are immediately corked and wired securely, and then submerged in a water bath to a depth of about 1 inch above the bottles.

The advantages of this process are that the fruit juices will remain sweet indefinitely, will not ferment, and are free from all deleterious matter.

Smoke or Vapor Preserving Compound.

Rebecca A. McDaniel of Burr Oaks, Ia., has patented the following, which is one of quite a number of this class of preservative processes:

"In preserving different articles, such as fruits, meats, and other edibles, I subject them for a proper time—differing with different articles—to the fumes arising from burning the compound. This may be accomplished by confining the articles to be treated in a chamber in which the compound is being burned.

COMPOSITION.

Salicylic acid	1 ounce.
Sulphur	2 pounds.
Pulverized orange peel	¼ ounce.
Ground cinnamon	3 ounces.

This compound well mixed will burn slowly and generate fumes or vapor which have a peculiar action in the preservation of fruits, butter, milk, pies, bread, eggs, and all kinds of cooked or uncooked food. In treating meats add nitrate of potash, 4 ounces.

Treatment: Provide a box or other chamber with shelves upon which the articles to be treated may be placed. Within the chamber, properly closed, I burn a suitable quantity of the compound, allowing the fumes to bathe the articles to be treated. The compound is of a quality that will burn slowly by reason of its peculiar composition, and it may be burned with fuel other than it contains."

Salicylic Acid as a Preservative.

Salicylic acid, aside from its remedial value, is used largely as a preservative, either in a dry state or in the form of a solution in water or alcohol. Salicylic acid is a white, dry, crystalline powder, devoid of smell or taste, undergoes no change when kept in store, and is neither inflammable nor volatile. It can be procured in almost any drug store, and since 1874 a new process in its manufacture has cheapened it in price and placed it within the reach of all.

Medical authorities agree in considering the daily consumption of 1 gramme as being not only perfectly inoffensive, but decidedly beneficial to health. An individual living on a salicylated diet would not absorb so much of the salicylic acid per diem as that which is prescribed to be taken for the prevention of epidemics and other ailments, such as gout, rheumatism, catarrhal affections, etc.

The proportions in which salicylic acid dissolves are:

One part by weight in 300 to 500 parts of cold water.
One part by weight in 18 to 20 parts of hot water.
One part by weight in 50 parts of glycerine.
One part by weight in 3 parts of absolute alcohol.

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In rum, brandy, wine, cider, etc., it dissolves according to their respective strengths and temperatures.

NOTE.—By contact with iron in any form salicylic acid takes a violet color.

This must be noted, especially when treating milk, etc., if contained in metallic vessels. The only bad effects will be simply slight discoloration.

MEAT.

It is a well-known fact that, especially in hot weather, meat, poultry, and game, although apparently quite fresh, prove, on closer examination, or often only when cooked, to be tainted and of bad odor. This can be entirely removed by either watering and washing the meat in a lukewarm solution of salicylic acid (three to four teaspoonfuls of acid to two quarts of water), or by adding a small pinch of the dry acid in powder, during the cooking.

To keep meat for several days from becoming high or tainted:

Place it for twenty or thirty minutes in an aqueous solution of 8 drachms of salicylic acid to one gallon of water.

Rub into the surface of the meat some dry salicylic acid, particularly about the bony and fatty parts; the meat to be afterward cleaned before cooking as usual.

Although the raw meat treated with the acid turns slightly pale on the surface it suffers no change whatever internally. Meat thus treated with salicylic acid requires, also, less cooking to render it tender.

PURE MILK.

A third of a teaspoonful (or, if the temperature be high, a little more) of the solid acid to a quart of milk delays the process of curdling for thirty-six hours, without influencing its property of yielding cream.

BUTTER

Washed with an aqueous solution (four drachms of acid to a gallon of water), or kept in it, or wrapped in cloths soaked in this water, keeps fresh for a very long time. Butter already rancid can be improved by treatment with a stronger solution (8 drachms of acid to 1 gallon of water), followed by washing in pure water. The bad smell often arising in salted butter is entirely prevented by addition of the acid.

JAMS OF ALL KINDS, JELLIES, PRESERVES, AND PICKLES,

Of every description, made in the usual way, but with the addition of about 1 drachm of salicylic acid to every 4 pounds of the preserve, will keep sound with absolute certainty for a much longer time, fermentation and mouldiness being prevented. Under exceptionally unfavorable circumstances, such as hot pantries, a little of the dry acid should be sprinkled on the top of the vessel or preserve pot. A tightly-fitting piece of blotting paper, previously saturated with a concentrated solution of salicylic acid in spirit, brandy, or rum, and placed on the top of the preserves will also greatly aid in keeping them.

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NEW-LAID EGGS

Can be kept for a very long time by being placed for half an hour in a cold, saturated, aqueous solution of the acid, then allowed to dry in the air, and, as usual, kept in a cool place. Some prefer to coat them by dipping them in melted paraffine after they have been treated in this manner. (Use no straw or hay in packing eggs.)

THE YOLK AND THE WHITE OF EGGS

Are most effectually preserved for a long time by the addition of ½ to 1 ounce of the acid per 20 pounds of these substances. It is also well to place a paper soaked in the salicylic acid solution on the top of them, which greatly enhances the preserving effect.

In the manufacture of vinegar, salicylic acid is also of great importance to prevent false or excessive fermentation, putridity, etc.

WINE.

With respect to wine the experiments of Prof. Neubauer of Wiesbaden have proved that the introduction of the acid for the preservation of wine marks an era of great industrial progress, as it energetically prevents, even when used in very small quantities, the formation of mould germs and other circumstances which are injurious to wine, while it absolutely arrests secondary fermentation, cloudiness, etc. As wine differs very much in its constitution the requisite quantity of salicylic acid must be found out by practice in each particular case. About ¼ to ¾ of an ounce per 50 gallons will be found sufficient for most wines. In using the salicylic acid for this purpose it is recommended to make a strong solution of it in pure spirit, perfectly free from fusel oil, and then to add of this solution as much as may be requisite.

If in addition to this the casks are washed out with an aqueous solution of the acid it will prove of great service, and all other agents at present used for this purpose will soon be abandoned. The larger the amount of sugar in proportion to the alcohol the more salicylic acid will be required. The addition is best made when the wine has attained its full ripeness. The effervescence of wine in spring, or after carriage in warm weather, will at once be stopped. The salicylic acid kills all kinds of germs, and destroys the growth and action of any yeast which may still be present; it is therefore of incalculable value in effectually preserving wine, and as a preventive of the deterioration to which this liquid is subject.

Must, fresh from the press in autumn, can be kept without fermentation perfectly fresh, bright, and sweet for six to eight months by the addition of 1 to 1½ ounces per 50 gallon, or of ¾ ounce per 100 bottles. Sparkling Must requires an addition of 6 to 7 ounces of salicylic acid per 100 gallons. In the same manner all kinds of fruit-wine which, as is well known, soon turn sour, can be preserved by the addition of a similar quantity of salicylic acid. Must kept still for transport can at any time be set into fermentation by a slight addition of carbonate of soda and fresh yeast.

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BEER.

Experiments made upon a large scale have placed beyond a doubt the remarkable properties of salicylic acid as a preventive of secondary fermentation and acidity in beer, and as a preservative of beer in a sound condition when sent out or exposed to the noxious influences of warm cellars, change of temperature, etc. The amount of salicylic acid required to produce the best effects in preserving beer varies according to the quality of the malt liquor; but half an ounce per barrel of 36 imperial gallons will be very generally found to answer the purpose well. The addition of the salicylic acid delays secondary fermentation in stock and export beers, which may then be kept for any length of time without becoming unsound or of unpleasant flavor. Less than a quarter ounce of the powder of salicylic acid per barrel of boiling wort strewn into the same while turning out will destroy or suspend the vitality of the false ferments, especially that of the lactic ferment, in the fermenting vats, and this not only without injury to the yeast cells, but keeping them free from parasitical growths. In this manner the fermentation will take a steadier course and enable the liquor to attain its perfection during the ensuing still fermentation in the cask, into which another quarter ounce or more of the acid is to be given per barrel a fortnight before racking. Stout, and in fact all beers for export to a hot climate, require rather more.

For long transports the acid in powder can be simply thrown into the export casks, in which it dissolves in the course of three days instead of a week, which is required by the cold beer lying quietly.

BOTTLED BEER NOT SALICYLATED IN THE CASK.

The clean bottles must be rinsed with a solution of 1 part of salicylic acid in 4 or 5 parts of spirit (free from fusel oil), which can be poured from 1 bottle to another. Or, a small pinch of the acid in powder is placed in every bottle before filling.

The corks should always be boiled in water containing 1 ounce to the gallon, which is also efficient in disinfecting tubes, taps, etc.

CIDER.

Dissolve ¾ of an ounce of salicylic acid in a gallon of cider, and then add this amount to each barrel of cider. This is superior to any preparation of lime. The cider must be treated when fresh.

GLUE, GELATINE, GUM ARABIC SOLUTIONS, PASTE, SIZE, STARCH, INK, SKINS OF ALL KINDS, ETC.

Are successfully preserved for a length of time from decomposition or deterioration by means of salicylic acid. One-thousandth part of the acid introduced into a vat of geletine or into decoctions of animal matter, prevents their undergoing decomposition for an indefinite period of time. Calico printers are using half a pound of the acid to every 100 pounds of dressing starch, in order to entirely preclude the disagreeable odor arising after awhile from dry goods in store.

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IN THE PROCESS OF TANNING,

If the bark-color be slightly salicylated, this liquor will not undergo the change which, instead of making the hides and skins swell, often causes the opposite effect, contracting them by an alkaline action, and at the same time imparting to them a putrid odor. Treatment with carbolic acid also leaves a most objectionable odor, especially in fine leather goods. The use of salicylic acid will thus be found highly remunerative to all tanners, as it has proved in the industries already alluded to.

IN SUGAR FACTORIES

Three drachms of salicylic acid are used to every 300 pounds of beet-root in the diffusing liquor, in order to prevent fermentation, and for destroying the parasitical growths, especially noticeable in the old material.

FOR DISINFECTING.

Fumigation with the acid purifies the air and walls of closed rooms. Simply evaporate some on a heated shovel, which must not be red-hot.

The air in crowded buildings, schools, barracks, hospitals, factories, etc., will be improved by keeping the floors sprinkled with the solution. In sick rooms this is of great importance, the dust settling on the floor being the readiest receptacle and means of transmitting the microscopic fungi or germs of infection which float in the air.

VESSELS, CORKS, ETC.,

Are very well cleaned and disinfected by washing them with an aqueous solution of the acid. This deserves especial notice.

It is evident that numerous advantageous applications of salicylic acid are carried out besides those enumerated above, but the descriptions already given will enable any person interested in the matter to find out the best means of deriving profit from the wonderful properties of this extremely useful substance.

Ice-House and Refrigerator.

BY JOHN TAYLOR.

Houses built on this plan are lined throughout the inside with sheet iron. There is a layer of felt nailed to the sides, ceiling, and floor of the room, and on this is nailed the sheet iron. It is then painted with two heavy coats, it being the aim to fill up all joints and seams with the paint. But as the tin and felt do not render the room absolutely air-tight, I am of opinion that it can as well be dispensed with. It might save some ice if the seams were all soldered. The layer of cement, asphaltum or gas tar, which should cover the ground below the joists, is to protect the room from the moisture and warmth of the earth. Above this layer should be about 30 inches of dry sawdust or turners shavings, well packed up to the level of the top of the joists.

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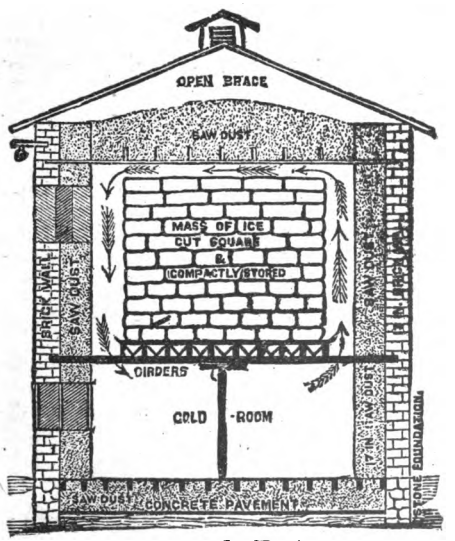
The drainage from the ice is carried off by a series of V-shaped tin or iron troughs, which run between the joists, all of which carry the water to one point, where it is carried outside by a trap-pipe. These troughs reach over to the center of the top of the joists, and are soldered together, so that no water will drip on the floor below. It will be seen that in this plan there is no sawdust or other preservative in contact with the ice, and that the air of the room circulates around and over the ice. As long as the temperature of the goods stored is above the temperature of the room there will be a gentle draught around the mass of ice, and of course all the moisture in the air, vapors, and odors from



Refrigerating House.

the goods will condense on the ice and pass off, so that you can keep milk, cream, butter, fruits, and meats all in the same chamber without danger of injuring the flavor of either. The atmosphere of the room is always dry, sweet, and pure.

The features of this plan can as well be carried out by arranging a room inside of another building.

I should have explained before that the ice does not rest directly on the joists; but there is a bed of oak lath, about 1½ by 3 inches, laid across the joists, about 4 or 5 inches apart, on which the ice is laid. I would

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further suggest that another cold chamber can as well be had by making a cellar under the one shown, with a lattice floor between them. It would be necessary to finish the sides and bottom of this cellar in the most complete manner, as above described. At the entrance to the store-room there must be a vestibule, either inside or outside, as space or circumstances may direct. If outside the walls should be thick and the door very heavy. The doors, both inside and outside, should be fitted with rubber, so as to close perfectly tight, and both doors must never be opened at the same time. This vestibule should be large enough to contain a fair wagon load of goods, so that if you are receiving a load of stuff you are not required to stop until all is in the vestibule and ready to store. This house only needs filling once a year. The temperature will range from 34 deg. in winter to 36 deg. in summer, and will preserve fruit perfectly from season to season. The opening for putting in the ice, shown just under the pulley in the cut, has two doors with a space between; each door a foot thick. The window in the cold room has three sets of sash, well packed or cemented. The walls are 13 inches thick, lined with 17 inches of sawdust. Thirty-six inches of sawdust are put on the floor over the ice. The building shown is 25 feet square, inside measure, and 22 feet from floor of cold room to ceiling over the ice. The ice-room is 12 feet high, and the cold room 9 feet. Pillars are required under the center of the ice.—*Country Gentleman.*

Cheap Ice-Houses.

Settlers in the newer portions of the country are often deprived of many comforts which are easily accessible in long-settled places. Whatever contributes to lessen these privations, if at little cost, should merit special attention. A cheap ice-house may be made to afford an impor-

FIG. 1.

tant share of country comforts in such settlements. There is nothing to prevent an abundant supply through the heat of summer where there is a stream or sheet of water within two or three miles from which clear blocks of ice may be sawed. Sawdust is the best material for packing,

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but in its absence chaff, chopped straw, or even straw unchopped may be made to answer the purpose.

A costly and elaborate building is no better than the cheapest structure for keeping ice, if care is only taken to have it properly packed, which is very easily done after one "knows how." We have never seen ice better preserved through a long and hot summer than in a board shanty with only one thickness of siding, and that full of cracks and crevices. For a new settlement one built of logs, like that shown in the accompanying figure (Fig. 1), may be made to answer a good

Fig. 2.

purpose. The floor may be slabs, and the roof a covering of brush to hold the packing to its place, if a slab roof is not readily made. If sawdust is used for packing the crevices between the logs will need close stopping; or, still better, it can be faced on the inside with slabs set upright, with the smooth side inward. If straw is employed the rough logs may remain, and the crevices between them may be left open. For sawdust a well-packed space of 10 inches between walls and ice will keep the ice well; chopped straw should be 15 or 20 inches thick, and long straw should occupy a space of 2 feet. Stiff, coarse straw will not answer unless packed very solid; finer and softer, as of thickly sown

Fig. 3.

oats, is better, and the walls which it forms need not be quite so thick. Fine hay would be still better, and would answer if only a foot and a half thick and well put in. Dry swamp moss, such as nurserymen use for packing trees and plants, would be one of the very best substances for protecting the ice, if only a foot thick.

Having prepared the house and packing cut the blocks of ice of precisely equal size, using a cross-cut saw with one handle removed, to go under water. The size should be measured and scratched on the surface for the saw to follow. Two feet square is a convenient size. When cut

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lift them out with a light plank having a batten nailed across one end to hold them (Fig. 2). Place about 10 inches of sawdust on the floor (or twice as much solid straw), and build the structures solid with the ice blocks, ramming in the sawdust or other packing as the structure goes up (Fig. 3). When finished cover it with a thickness of packing nearly equal to that at the sides. It is important that there be free ventilation

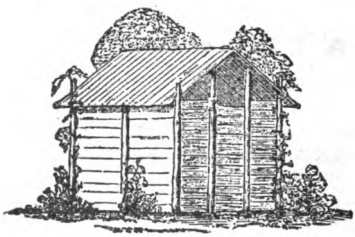

Fig. 4.

over the top, which the loose brush will not prevent. If there is a slab roof the air must blow freely between this roof and the top covering. The slab floor will allow a free drainage of all the water which runs down through the packing from the melting ice.

A structure nearly as cheap as the preceding is represented in Fig. 4. It is made by setting rough posts into the ground with the inner sides

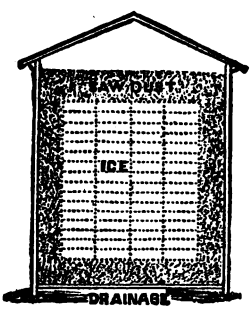

Fig. 5.

straight or faced with the ax, and then nailing common rough boards on them (like a tight fence) to a sufficient height. The floor is made as already described, and the roof may be boards or slabs. The openings at the gables perform an important part in the ventilation by admitting all the air that can sweep over the top sawdust. Fig. 3, already referred to, is the ground plan, and Fig. 5 is a vertical section.

There are three requisites to be secured in order to keep the ice suc-

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cessfully: 1st. The closely packed, non-conducting substance on each side, under and above the mass of ice. 2d. Perfect drainage at the bottom without the admission of air. 3d. Free circulation of air over the top covering. If these requisites are observed the result will be entirely satisfactory.—*Country Gentlemen.*

A Cheap Ice-Chest.

Procure two dry-goods boxes, one of which is enough smaller than the other to leave a space of 3 or 4 inches all around when it is placed inside. Fill the space between the two with sawdust packed closely and cover with a heavy lid made to fit neatly inside the larger box. Insert a small pipe in the bottom of the chest to carry off the water from the melting ice. For family or grocers' use this will prove even more serviceable than some of the high-priced patent refrigerators.

Ice Without an Ice-House.

Select a dry, shady spot; dig a ditch for carrying off the waste water, and over it place a lath-work. Upon this lay a thick layer of moss, leaves, or sawdust. Now pile upon this the cakes of ice, the larger the better, and cut or sawed square in such a manner as to leave as few spaces as possible, filling up those which may occur with fine sawdust in order to prevent the air from penetrating into the interior of the pile. It is best to build the pile in the form of a pyramid. When completed it is covered with straw, moss, or leaves as thick and as close as possible, a layer of earth being thrown upon it to secure the covering and as a further protection to the ice. Where a stream or lake is inaccessible from which to procure ice for filling ice-houses, especially where a small quantity is stored, the ice can be frozen with water from the well in boxes or other contrivance made especially for the purpose, which we leave to the ingenuity of those who are interested.

Freezing Mixtures.

Refrigerating salts and mixtures are used to produce cold artificially. They are used with or without ice or snow. As is well known common salt mixed with pounded ice or snow lowers the temperature to a considerable degree, so there are other mixtures which will produce a still greater degree of cold. The following simple and cheap preparation, when mixed according to directions, will produce artificial cold suffi-

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cient to cool wines, etc., without the aid of ice: Take common sal-ammoniac, well pulverized, 1 part; saltpeter, 2 parts, and mix well together: then take common soda, well pulverized. To use, take equal quantities of these preparations (which must be kept separate and well covered previous to using) and put them in the freezing pot; add of water a sufficient quantity, and put in the article to be frozen in a proper vessel and cover up until cooled as desired.

These tables consist of mixtures having the power of generating or creating cold, with or without the aid of ice, sufficient for all useful and philosophical purposes, in any part of the world at any season:

FREEZING MIXTURES WITHOUT ICE.

MIXTURES.	*Thermometer Sinks.*	*Degree of cold Produced.*
Muriate of ammonium..... 5 parts Nitrate of potassium..... 5 parts Water.....16 parts	From +50° to +10°	40
Muriate of ammonium..... 5 parts Nitrate of potassium..... 5 parts Sulphate of sodium..... 8 parts Water.....16 parts	From +50° to +4°	46
Nitrate of ammonium..... 1 part Water..... 1 part	From +50° to +4°	46
Nitrate of ammonium..... 1 part Carbonate of sodium..... 1 part Water..... 1 part	From +50° to −7°	57
Sulphate of sodium..... 3 parts Dilute nitric acid..... 2 parts	From +50° to −3°	53
Sulphate of sodium..... 6 parts Muriate of ammonium..... 4 parts Nitrate of potassium..... 2 parts Dilute nitric acid..... 4 parts	From +50° to −10°	60
Sulphate of sodium..... 6 parts Nitrate of ammonium..... 5 parts Dilute nitric acid..... 4 parts	From +50° to −14°	64
Phosphate of sodium..... 9 parts Dilute nitric acid..... 4 parts	From +50° to −12°	62
Phosphate of sodium..... 9 parts Nitrate of ammonium..... 6 parts Dilute nitric acid..... 4 parts	From +50° to −21°	71
Sulphate of sodium..... 8 parts Muriatic acid..... 5 parts	From +50° to 0°	50
Sulphate of sodium..... 5 parts Dilute sulphuric acid..... 4 parts	From +50° to +8°	47

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FREEZING MIXTURES WITH ICE.

MIXTURES.		Thermometer Sinks.	Degree of cold Produced.
Snow or pounded ice	2 parts	From any temperature. to −5°	..
Muriate of sodium	1 part		
Snow or pounded ice	5 parts	to −12°	..
Muriate of sodium	2 parts		
Muriate of ammonium	1 part		
Snow or pounded ice	24 parts	to −18°	..
Muriate of sodium	10 parts		
Muriate of ammonium	5 parts		
Nitrate of potassium	5 parts		
Snow or pounded ice	12 parts	to −25°	..
Muriate of sodium	5 parts		
Nitrate of ammonium	5 parts		
Snow	3 parts	From +32° to −23°	55
Dilute sulphuric acid	2 parts		
Snow	8 parts	From +32° to −27°	59
Muriatic acid	5 parts		
Snow	7 parts	From +32° to −30°	62
Dilute nitric acid	4 parts		
Snow	4 parts	From +32° to −40°	72
Muriate of calcium	5 parts		
Snow	2 parts	From +32° to −50°	82
Crystallized muriate of calcium	3 parts		
Snow	3 parts	From +32° to −51°	83
Potash	4 parts		

COMBINATIONS OF FREEZING MIXTURES.

MIXTURES.		Thermometer Sinks.	Degree of cold Produced.
Phosphate of sodium	5 parts	From 0° to −34	34
Nitrate of ammonium	3 parts		
Dilute nitric acid	4 parts		
Phosphate of sodium	3 parts	From −34° to −50°	16
Nitrate of ammonium	2 parts		
Dilute nitric acid	4 parts		
Snow	3 parts	From 0° to −46°	46
Dilute nitric acid	2 parts		

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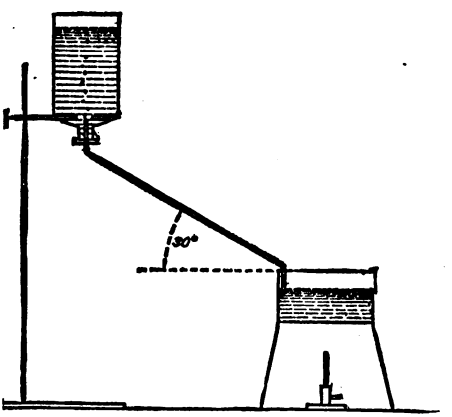
Constant Water Baths.

[*American Chemical Journal.*]

The following simple form of constant water bath, which wastes no water, I have found to be very convenient:

A tube of glass or metal, not less than ¼ of an inch internal diameter, the ends of which are cut off obliquely, is bent as shown in the cut. It should make an angle of about 30 deg., or a little greater, with the horizontal. The angle may be diminished if the bore of the tube is increased. One end is inserted in the water bath, the other in an inverted bottle. The height of the water in the bath is regulated by the depth of immersion of the tube in it. The boiling is not interrupted by the feeding, which takes place slowly and regularly. It is necessary that the ends of the tubes should be cut off obliquely. The same form of



tube answers equally well for keeping a constant level in a filter or drying chamber.

A brass tube is much better than a glass one, as it does not crack at the water level after using for a time. Brass tubes can easily be bent by ramming full of sand, stopping the ends, and bending them over a curved surface. A large number of baths can be run by this apparatus by connecting them with a bath fed by it.—*Charles T. Pomeroy.*

NOTE.—We have used for a number of years in this laboratory a form of constant water bath which was contrived by Mr. Edward Bogardus, formerly chemist to the New Jersey State Geological Survey. As I have not seen it described in print, and as it is cheap, simple, efficient, and ingenious, I will draw attention to it here.

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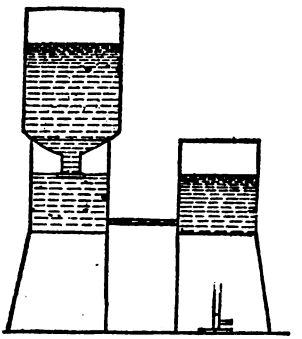
The following cut represents the apparatus:



It consists of two tomato cans connected by a tin tube. Into one of the cans a bottle of water is inverted. We generally use a five-pound acid bottle. The other can makes the bath. This bath can be left running over night without fear. A large number of baths can be run by this contrivance by simply connecting them, by means of rubber tubes, with a resefvoir replenished by an inverted bottle. Old fruit cans make excellent baths. A series of holes can be punched round the lower edge of a fruit can, thus affording a distributing reservoir. Corks holding short pieces of glass tube are inserted into the holes. By means of these the reservoir can be connected by rubber tubes with a number of baths at quite a distance. The baths are made by punching a hole near the lower edge of a fruit can and inserting a cork and short piece of glass tube. When the extra vents of the reservoir are not used, they can be closed by a short rubber coupling and a pinch cock.—*Peter T. Austen, Chemical Laboratory of Rutgers College (New Jersey State Scientific School).*

Silos and Ensilage.

The practice of preserving roots, vegetables, and plants by covering them with earth or by placing them in cellars, etc., is an ancient one, but the practical application of the principle on a large scale to the preservation of fodder-corn, clover, etc., as a food for stock is comparatively a recent practice, the first silo in this country having been built within the last twelve years. Previously, however, the French and English gave the subject considerable attention, but it seems that within the last two or three years our American experimenters have made great improvements in the process and construction of the silo by which more

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successful results have been attained than ever before and have awakened much interest among the progressive class of farmers and stock-growers throughout the country.

A number of the Agricultural Experiment Stations located in the different States, particularly those of Wisconsin, Illinois, and also the Agricultural College at Guelph, Ontario, have made extensive applications of the process. Several articles from them detailing the success of the experiments for the past season have appeared in the columns of *The Breeder's Gazette* of this city. Through the courtesy of the editor and Prof. W. A. Henry of the Wisconsin Agricultural Experiment Station we are enabled to present full instructions in regard to constructing and filling a silo. These, with clippings which we include from the writings of others high in authority on the subject, contain as full an account of recent experiments as we can give with our limited space.

"Agriculture never took a longer stride in advance than it did when the silo was added to the practical equipment of the farm. Most of us were slow to realize this at first, and a great many are yet unwilling to concede the advantages claimed for the silo, but the utility of the modern silo cannot be gainsaid, for without it we are left at the mercy of the elements in the handling of our great corn crop, There was much truth in the statement that the silo as first introduced was too expensive for the average farmer, but in no department of the farm has there been such a change of opinion and methods of attaining desired results as is the case with the silo. The modern wooden building is not only less expensive but vastly superior to the original cellar or stone structure and every year's experience is throwing light in hitherto dark places, so that in a short time the progressive dairyman or beef-raiser will think no more of filling his silo than our fathers did of filling the barn with hay, and with proper facilities for handling the corn no part of the silo work will be as hard as pitching hay over the 'big beam.'" * * * *Supt. Adams, Wis. Agr. Exp. Station.*

* * * A *silo* is a place where fodder is preserved in a succulent condition. It may be a pit, a box, a mow, a tank, a building, or a trench in the earth. *Silage* is the word denoting the fodder so preserved. *Ensilage* is the term applied to the process or system. *Ensile* is the verb expressive of the action of making silage. *Ensilor* stands for the person using the *silo* to *ensile* fodder for *silage* by the process of *ensilage.* —*Prof. James W. Robertson, Ontario Agr. Col., Guelph.*

* * * I further believe that our present knowledge of the silo and the best methods of storing crops therein is not perfect, and that we will make great advancement in the future; but that we have reached a point where this method is within the possibilities of our average farmers, and it is this class most of all that needs this method. The time has come when we must produce more beef, butter, wool, and pork to the acre or sink beneath the wave of competion that is driving over our land. The silo seems to be a valuable and important means to this end. —*Prof. W. A. Henry.*

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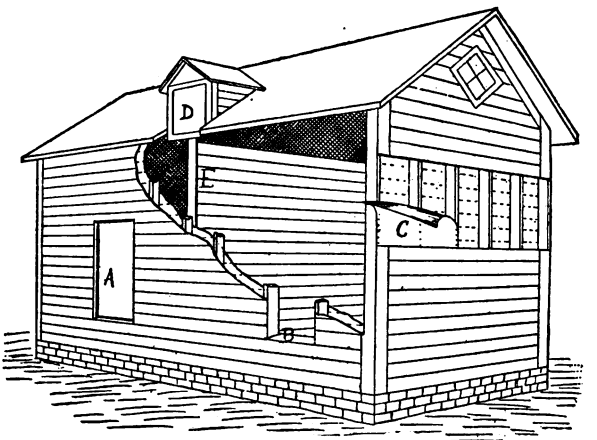
CONSTRUCTING THE SILO.—BY PROF. W. A. HENRY.



A 100-TON DOUBLE SILO.

"Silos are like houses, no two individuals can agree upon the same plan; for this reason I approach this branch of the subject with no expectation of pleasing all or of giving directions for making a perfect structure. I deem it best to give a description of one way in which a double silo may be built and leave it to the reader to introduce such modifications in the plan as may best meet his particular wants and circumstances. The drawing herewith presented shows an ideal two-room silo 16 feet wide, 32 feet long, and 16 feet to the eaves. Built as described each room would have a capacity of over 3,000 cubic feet which would contain about 50 tons of settled ensilage weighing 35 pounds to the cubic foot. We may say then that this figure represents a 100-ton silo. For the foundation of this structure either brick or stone may be used, going deep enough to avoid heaving by the frost and rising 6 inches or 1 foot above the surface of the level ground about it. Upon this wall a sill should be laid which had best be constructed of 2x10 inch plank. One of the difficulties in silo construction is to avoid spreading of the building, which sometimes occurs through lateral pressure of the contents when settling. For this reason the sills must be well tied together at the corners; instead of using square timbers, which are greatly weakened by cutting, plank may be substituted and the corners of the sill constructed as in Fig. 2. If well spiked there will be no danger from spreading at the corners. The plank of which the sills are constructed should be at least 8 inches wide; 10 would be

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better. By using four of these, lying one on top of another, the sill will be 8 inches thick. Midway between the ends of the building a cross wall should be built, and on this a sill should be laid upon which to erect the partition which divides the silo into two compartments. This

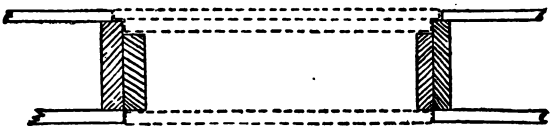

FIG. 1.

cross wall should be so worked into the side walls as to hold them securely, and thus prevent the silo from spreading on the sides. A little ingenuity will make the foundation and sills secure. If possible the sills should be as wide as the wall upon which it rests, but if this cannot

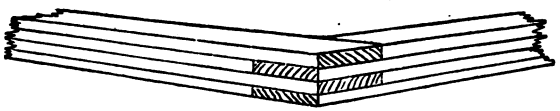

FIG. 2.

be conveniently done the wall of stone or brick should be raised above the ground but a very few inches at most, as the ensilage in settling on the shoulder made by the jutting wall is almost certain to spoil at that point. Having laid the sill upon the wall in the manner described

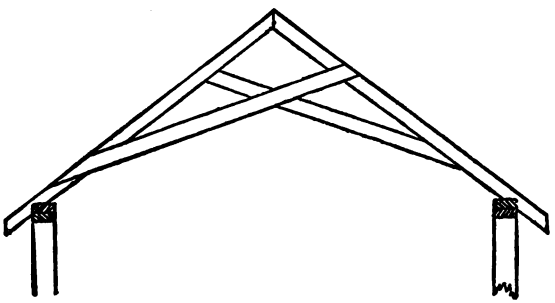

FIG. 3.

proceed to erect the building by standing 2x8 or 10-inch studding perpendicularly upon this sill, placing them not further apart than every 16 inches, so that a sheet of tarred building paper will lap two studding in each case. The reader is cautioned to measure the building paper care-

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fully before setting up the studding, as it is sometimes scant in width and trouble will occur when one attempts to tack on the paper. Double the studding at the corners. In the illustration of the building I have not placed the proper number of studding, but the reader can rest assured that once in 16 inches is not too often. Having placed our studding in position and secured them by a plate running around the top we are ready for the rafters. Fig. 3 shows how these rest upon the plates and how they are tied together so as to least interfere with the filling of the silo. For a cheap silo boards may be used, though probably shingles are the cheapest in the end. In the roof upon one side place a dormer window at D in the illustration; this window is immediately over the partition. It is intended that the ensilage carrier shall pass up through the window so that the ensilage will fall over the partition and can be deposited in either one of the two compartments by means of a slanting chute. If one does not wish to undergo the expense of the dormer window a scuttle in the roof is all that is necessary. The roof is the same as for any building.

"We are now ready to sheathe the silo; let us begin on the inside. First of all tack tarred building paper to the studding, running the strips up and down and having them catch on every third studding. Avoid all openings or rents in the paper. Having placed the paper take common boards dressed on one side and sheet up to the top of the studding. When this is completed repeat the operation by placing a second layer of boards over the first, breaking joints. Narrow boards are preferable to wide ones for this work, as they will swell without bulging. We have double-boarded the inside of our silo by this operation, and rendered it practically impervious to the air. I see no reason for using anything but common lumber for this purpose, as upon swelling it will close up tight enough to keep out the air. Upon the outside of the studding tack building paper again, as shown at Fig. C in the first illustration. Over this paper place any kind of boards that the fancy of the builder may dictate, as clapboards, shiplap, or drop-siding. It will be seen that our walls are constructed as follows, beginning at the outside: First, siding; second, building paper; third, a dead-air space of 8 or 10 inches; fourth, building paper; fifth, common boards; sixth, common boards. No sawdust, tanbark, or other filling should be used, as a dead-air space is a better non-conductor for our purpose and less expensive than any of these. The partition can be built of narrower studding than those used on the sides of the building, and one thickness of boards used on each side, together with building paper, as in the first instance, is sufficient. To prevent lateral pressure bulging the silo two iron rods should be run through the partition walls joining the sides of the building, placing one about two feet above the partition sill and the other about four feet above that. Half or three-fourths-inch rods with heavy caps at the ends should be sufficient, and are easily put in place before the boards are tacked to the partition.

"Two doorways should be left by cutting out a single studding in each compartment upon the most convenient side. These doorways reach to

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within three feet of the ground, and should be about seven feet in height. They need not reach to within five feet of the top of the building. The ensilage will settle in the silo several feet, and when the time comes to pass it out through the doorway it takes but little time to dig down two or three feet to the top of the door and make an opening large enough to pass out the upper layer. Fig. 1 shows one of the ways in which a doorway may be made so that it can be boarded up air-tight. Instead of making solid doors hung on hinges I think it is better to use boards that will fit in crossways, making them double thick, and having the inside board even with the inside boarding of the silo, as shown in Fig. 1. Do not make the doorways over 6 or 7 feet in length vertically, as in all cases they weaken the structure. Endeavor to have the inside of the silo smooth and perpendicular from top to bottom, with no jogs or shoulders upon which the ensilage can catch or drag.

"If built above ground fill the rooms of the two compartments with earth until the surface is three or four inches above the outside level, so that no water will at any time enter to injure the ensilage that rests on the ground. I do not yet know which is the best method of preserving the silo from decaying. This is an important branch of the topic, but it has thus far received little attention. Some have recommended using kerosene for an inside coating. We shall try that this season, and also gas or roofing tar, which I think will be excellent. This roofing tar when heated becomes liquid, and can be applied with a mop to the inside of the silo. As soon as it cools it hardens into an impervious glossy layer that I should think eminently adapted to this purpose.

"Having no ceiling or floor, and being built of common material, there is no necessity for the silo being an expensive structure. Of course the reader will modify the description given to suit his own wants and circumstances, but I can assure him that in some such way he can provide a silo at no great expense.

"After the structures built for the special purpose comes the modification of building already erected. A great many farmers are building over bays in their barns for silos. This is easily accomplished by placing studding all around the bay and double boarding on the inside. If one fears cold weather he can make a dead-air space by using two sets of studding and boarding on the inside of the bay. Stone buildings can be converted into good silos by furring out and double boarding on the inside. In general I am adverse to stone structures for this purpose unless thus boarded. Some kinds of stone seem to do very well, but stone walls carry off the heat and moisture too rapidly to make good silo walls. If one wishes to try preserving corn-fodder and cannot afford a structure of wood, he can excavate a pit in the earth and bury the corn-fodder therein, though I am sure he will soon give up this practice as unduly expensive.

"A word in regard to the location of the silo. It may be built adjoining the feeding barn with the doors so placed that the ensilage be conveyed directly to the cattle, or if that is not possible, place it where the ensilage can be conveyed by a car or cart. Mr. Hiram Smith of this

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State, who has large silos and uses ensilage extensively, holds that it is not inconvenient to have the silo located a few rods from the feeding barn. The ensilage is pitched into a cart with forks and the cart driven into the feeding barn between the two rows of cows which stand facing each other. The ensilage is placed in front of the animals directly from the cart with great rapidity. In some cases a car can be used which can be run down grade into the barn in front of the cattle. I think either of these methods is preferable to attempting to carry ensilage in baskets any distance.

FILLING THE SILO.

"Probably very few stone silos will be built in the future, for experience shows that a stone wall chills the ensilage during the curing process and if it does not seriously injure that portion next to it to a thickness of several inches it renders it at least less palatable than ensilage nearer the middle of the silo. One reason, in my judgment, that the silo has not won more friends in the Eastern States is owing to the common use of stone in its construction. On our experimental farm at Madison our first silo, built in 1881, was of stone, and our conclusions in regard to ensilage were made up from results obtained with this silo; had we put up a wooden structure I am confident our results would have been worth vastly more to our people than they have been.

"The question of stacking ensilage is sometimes raised, being urged upon our people by the practice of our English friends, who are experimenting quite largely in this direction. It will be no more profitable to stack ensilage in the Northern States than to stack hay, and even less so in my judgment, for the waste would be very considerable and no one would relish the job of handling it during bad weather. Silos built of wood or made by changing over the bays of barns are the proper structures, judging from our present knowledge, for the Northern States; our friends at the South may find stacking successful.

"Having constructed the silo somewhat after the one described, though, be it remembered, large latitude is allowed in this matter, we will proceed to fill it with one of the two crops most suitable for the purposes; clover or fodder-corn. If clover is to be used I would recommend that a hay-loader be tried for the purpose of picking it up just as left by the mower. I have hopes that some form of hay-loader will do this work satisfactorily. The clover, either fresh or partly wilted, in any degree of dryness indeed, may be carried at once and unloaded into the silo, care being taken to fill and tramp down the corners and along the edges so that when all has thoroughly settled there will be no air spaces to favor decay. To fill a silo with clover is indeed a most simple process. By having two divisions the pits can be filled alternately, each layer of material heating up to the required temperature before the next is placed over it.

"For fodder-corn the processes are a little more complex, though in reality very simple. The fodder-corn should be allowed to approach maturity, the best point for cutting being not far from that at which we

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would ordinarily cut any shock. By this I do not mean to allow the leaves to become dry and crisp, but rather that they show a change from deep rank green to that yellowish tinge indicative of maturity, though with still an abundance of moisture in them. Formerly ensilage corn was cut shortly after the tassel appeared. Without doubt very considerable loss was incurred by such a practice.

"It is evident that if we cut our fodder at the time the corn is glazing our practice is as near correct as the present stage of investigation points out. Since the period of filling the silo will occupy several days, or even a couple of weeks, we must gauge the date of commencement to strike the best average conditions. For cutting the fodder some parties recommend the use of the reaper, but I judge from what I have been told that a good many rakes have been broken in attempting the work, and that many have given them up and gone back to the use of the corn knife. Such must be the case usually, at least where large varieties of corn are grown. The stalks should be cut close to the ground and thrown into bundles or gavels. If the weather is at all threatening I think it proper to cut and shock, since the fodder will dry off much more rapidly if rain falls, and it will not be so muddy and disagreeable to handle as when laid on the ground.

Last season the writer urged that the fodder be wilted before it was put into the silo, and his own experience, with that of many others, corroborates this method of procedure, which has the additional advantage that less water is handled in the operation. If it is intended to allow the fodder to wilt the corn had better be cut and shocked, after which it may stand from three to ten days, depending upon the maturity of the stalks at time of cutting and the weather. If the fodder dries out rapidly, from four days to a week is amply long for it to stand in shock, while if the weather is somewhat damp or the fodder quite green it may even stand ten days with no loss. One of the advantages of cutting and shocking is that when it is over the force of men employed in this operation can be changed to filling the silo. If the corn is cut and placed in the silo at once quite a force of hands is needed, but by cutting and shocking first we can avoid this double force.

"For drawing to the silo truck wagons are better than ordinary ones, since the fodder is more easily loaded upon them. The common practice is to attach a plank to the rear of the wagon, up which the men can walk with their arms full of fodder, which should be placed with tops all one way for ease in unloading. If the fodder is to be put through the feed-cutter the cutter should be placed so that the carrier will deposit it in either of the two pits as required. Formerly the carriers were so constructed that they would not work advantageously at a much greater angle than 45 deg., but now I note that some manufacturers have them arranged to carry almost vertically.

"In regard to the kind of feed-cutter to be used, it may be said that there are several valuable machines before the public, any one of which will prove satisfactory if properly managed. The only point I desire to urge is that a large machine be purchased, one having about double the

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advertised capacity. Small cutters are a nuisance; hand-power cutters are out of the question. The cutter should be driven by three horses on a sweep power or two on a tread, or by a steam engine. Many farmers delay ordering the cutter until within a week or two of the time to fill the silo and are obliged to wait weeks until it is received, thereby suffering great inconvenience and loss. As soon as the question is settled in favor of having a silo a cutter should be selected and ordered, and it should be set up and run in a test trial not less than a week before actual filling is contemplated, so that repairs or changes can be made. To run a feed-cutter properly requires considerable experience and some knowledge of machinery, and many persons have suffered serious losses by not giving this side of the subject due attention.

"This brings me to a point in the discussion of considerable interest to many persons who desire to have silos but dread the experience and expense of machinery. Corn-fodder may be preserved in a perfectly satisfactory manner without running it through the feed-cutter, and may be drawn from the field and deposited directly in the silo. The expense of putting corn-fodder through the feed-cutter, first and last, is not far from half of all that incurred from the time of cutting the fodder to closing the silo. To fill the silo with long fodder let it be drawn in the usual manner and lifted at once into the pit, which can be accomplished in several ways, either by hand or the horse hay-fork carrier and slings. In the silo it should be distributed evenly and probably had better be placed in regular layers, lapping "shingle fashion" so that it will settle evenly.

"The use of long fodder for the silo has been urged with considerable vigor by Mr. I. J. Clapp of Kenosha, Wis., one of *The Breeder's Gazette's* correspondents, and I think much good has resulted from his advocacy. There is no doubt but that long fodder will keep just as well as that which is cut up, and I am not at all certain but such ensilage is even better in some cases than that made by cutting up the stalks into small pieces. When cut into small pieces the fodder is considerably bruised, and there is much more exposure of the juices to the air than there is where whole fodder is used. My attention was called to this point by a recent letter from Mr. Clapp, and I hope we can make some observations on the subject in the future. At any rate let those parties who either from choice or necessity do not wish to use the feed-cutter hesitate no longer in regard to the silo if they wish to try it, but go ahead and place the whole fodder in one, and I am confident they will not be disappointed in its feeding qualities. The only difficulty with long fodder comes at the time it is to be taken out for feeding purposes; then if large varieties have been used the man who attempts to get it out of the silo will need strong muscles and a large degree of patience to enable him to tug at the compact mass, which is quite difficult to manage. Twenty-five cows will eat up the ensilage about as fast as one man can get it out. It may be just as economical, however, to put two men into the silo for an hour or two each day during the winter, when labor is cheap, to get out the ensilage as it is to use more expensive

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labor in the fall to accomplish the extra work of running the feed-cutter.

"Slow filling is without doubt the best method for securing good ensilage, no matter what material we are using, be it clover, long fodder-corn, or fodder cut fine. When the pit has been filled three or four feet deep no more should be placed within it until this layer has heated to the neighborhood of 125 deg. Fahrenheit. Mr. John Gould of Ohio, who has been a deep student of this subject from the practical side, I believe holds that the ensilage should be allowed to pile up as it falls from the carrier, and after the pile has heated to the right temperature it should be distributed evenly over the silo, throwing that which is hottest to the corners and along the walls. It is certain that ensilage usually heats up easily and rapidly except in the corners and along the walls, where we find the temperature does not rise so rapidly nor to the same degree as it does in the body of the silo, and anything that will help us overcome this lack will improve its quality, and I deem Mr. Gould's suggestion a valuable one. No packing down is needed except in the corners and along the walls; at these points we endeavor to firm the ensilage just as much as possible. I wish we could avoid this operation, and in the future we may do so. I believe the ensilage would be better without any tramping and packing if we could only get it to settle uniformly without. We should endeavor to secure an elevation in temperature of from 120 to 140 deg. uniformly throughout the mass of material. If the contents of the silo heat up to different degrees in different places we cannot expect them to be uniform in quality, though all will be eaten by the stock. The theory advanced by Mr. Fry of England that a temperature of 122 deg. Fahrenheit destroyed the ferment that produced the temperature seems hardly correct, for we find that the temperature goes on beyond this very rapidly—indeed, it is often very difficult to hold it below 140 or 150 deg., while in other cases I have known silos in which I could detect no faulty handling of the crop that would not heat to 120 deg. A case in point occurred last season; while we were busy filling our silos at the experimental farm I was called to the telephone by a young farmer living some thirty miles away who asked several questions about temperatures. I answered him to the best of my ability and the matter dropped from my mind. A couple of hours afterward, however, the party himself appeared on the scene in a troubled state of mind; he said he feared that he could not make his case plain through the telephone, and so had come on the first train to consult personally. His ensilage would not heat up to 120 deg., but was moulding badly instead. I advised that he go on filling the silo, ignoring the temperature question entirely. He did so, and in the winter reported satisfactory results. In my opinion we have much to learn in regard to this ferment, and that very close, patient study will be required to bring out the scientific side in a satisfactory manner. Fortunately we do not have to be very particular in our practice to obtain a very good quality of ensilage. I would advise, therefore, that a person allow the temperature to run from 120 to 140 when the thermometer is

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buried a foot deep in the fodder; but when these conditions are not obtained, no matter whether the degree be lower or higher, to go right on without feeling anxious in the matter. If the contents of the silo do not heat at all, or if the temperature gets up to 160 deg., the cattle will still eat the ensilage without complaint and relish it better than average dry fodder. I speak pretty positively upon this point because novices find it difficult to get over it and become quite excited and nervous if they cannot attain the exact directions given by most writers on this subject. The best rule is to go ahead, do the best one can, and the cattle will be very well satisfied with the result. Remember that the experience of a single individual or a single season may be no criterion for other cases. The reasons for these great variations are not yet apparent.

"Silo filling may go on for two or three weeks, or until the pits are filled, when they should be covered after standing a day or two to allow the last layer to heat. For covering material there may be placed over the ensilage building paper upon which may be placed sand, earth, chaff, cut straw, marsh hay, long straw, sawdust, or almost any material which will help keep out the air. If one wishes the pits may be left uncovered, in which case something like a foot of the ensilage will decay and form a covering and protection for that beneath. The practice of weighting the silo is now largely abandoned, though I am not certain but what some heavy material along the edges and in the corners will aid in saving the ensilage at those points, since it is here that the contents do not settle so well as does the body of the material. For a few weeks after filling the sides and corners should be tramped down occasionally to aid them in settling."

PLANTING, CUTTING, FEEDING, ETC.

The following extracts from "Bulletin No. 2," Illinois Agricultural Experiment Station, by Thomas F. Hunt, answers some important questions in regard to planting, etc.:

"The filling of the silo was practically continuous, and was done in three days, Aug. 20 to 22, 1887, with 54,525 lbs.—twenty-seven and a quarter tons—of green corn. About twenty tons of this consisted of a medium sized, fairly early yellow dent corn (Murdock), which had been planted May 4 to 6, in rows 3 feet 9 inches apart, with two to three kernels dropped every 9 to 12 inches in each row. At the time of cutting the stalks had well-formed but small ears, the kernels of which had largely passed the milk state; that is, the kernels were mostly glazed. The lower leaves were yellowish, and some had begun to dry. The growth, though not large, was thought satisfactory, considering the long-continued and severe drouth that had prevailed here. The yield was not more than seven tons of fresh fodder per acre. Seven tons consisted of a large, late maturing yellow dent corn (Leaming), which had been planted May 28, 1887. The kernels were in the milk and the leaves were entirely green. No marked difference was noted between the ensilage from this and that from the other corn. * * *

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"Feeding the ensilage was begun March 10, 1888, by mixing it with twice its bulk of dry, cut corn-fodder, not corn-stover, which our stock had been chiefly fed during the winter. The cattle soon learned to like the ensilage, and after the first week it was fed without mixing with any other substance and was eaten rather better, on the whole, than corn-fodder had been previously.

"Dairy weights of ensilage fed to the stock were not taken. From what weighing was done it is estimated that from March 17 to April 30 700 lbs. on an average were fed daily. During this time the following cattle were given ensilage: March 17 to April 30 two aged and five yearling bulls, one heifer, and one dry cow were fed ensilage, hay, and grain; eight milch cows, ensilage, straw, and grain; ten dry cows and five heifers, ensilage and straw. March 17 to April 16, three steers were fed ensilage and corn. April 13 to 30, four heifers and two dry cows were fed ensilage and hay. It will thus be seen that for 45 days 37 head were, on an average fed 700 lbs., about 19 each, daily. Of these 15 had ensilage and straw only; 8 had ensilage and straw with grain, usually four quarts of bran added daily; and 9 ensilage, hay, and grain. All thrived exceedingly well considering the amount of food eaten."

For information as to the results of future experiments with ensilage we refer the reader to the various State Agricultural Experiment Stations and the authorities here quoted.

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PART II.—STAGE ILLUSIONS.

The Three-Headed Woman.

In the booths of the market fairs at Paris and its suburbs (for example, at the "Gingerbread" Fair, at the Fête of St. Cloud, etc.), and in the tricks of jugglers, etc., who operate in the street, café concerts, or

circuses, we find phenomena that have a true scientific interest, ingenious applications of different sciences, or simply tricks that puzzle the spectator. Since, in general, people like to know the secret of what

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has surprised them, it may not prove uninteresting to devote a few articles to what may be called "side-show science." We will first speak of the process employed to produce the "three-headed woman."

The exterior of the little booth in which this phenomenon is exhibited is covered by a large painted canvas representing a three-headed woman in evening costume in a richly decorated drawing-room along with a few persons. For better convincing the curious a photograph taken from nature exhibits the phenomenal woman as she appears in the show; and every now and then the showman stops his drum to cry, "She is living, ladies and gentlemen, she is living!" If we allow ourselves to be persuaded to enter the booth we shall find ourselves separated from the stage by a balustrade—a sort of screen, behind which is the curtain. In a few moments the latter separates and there is distinctly seen a woman's body, the lower part of which is hidden by a basket of flowers. This body has three heads; one in the middle and two others grafted at the base of the neck of the first. These three heads move their eyes, answer together a few questions put by the showman, stick out their tongues, sing a few snatches of a popular song, and finally salute the audience, when the curtain closes and the show is over.

On almost every occasion some ingenious person is heard to express pity for this unfortunate person, who has no legs and three heads. This is the best praise that could be bestowed on the trick—for naturally it is only a trick. Moreover the showman is ready, for money, to explain how it is done. If we allow ourselves to be tempted, and enter the side-scene, we perceive on the little stage where the phenomenal woman just appeared nothing but a large plate of glass, slightly inclined toward the audience, and its edges hidden by drapery. Behind the mirror there is a recess whose sides are covered with a dead-black fabric. In front of the mirror, on the stage, sits the basket of flowers from which issued the woman's body. Then on an inclined board a little above the ground lie three young girls. One of these, the middle one, is clothed in a brilliant costume of silk of a light color, and it is she who, in the exhibition, makes the trunk, arms, and the middle head. Her legs are covered over with a black fabric, and she is supported by a cushion so as to permit the two other girls to place their necks closely against hers. The bodies of these two girls at the sides are completely covered with a fabric of a dead-black color. In front of these three young women are placed a dozen strong kerosene lamps provided with reflectors.

The heads, hair, and arms of the "body" are covered with powder, so as to present completely white surfaces. Such is the secret as revealed from the side-scene, and it will now be understood how the phenomenon is produced. All the white or light-colored surfaces being strongly lighted by the lamps that reflect the light, their image is sent by the glass toward the spectators, who perceive then the body of the female, her two arms, and her three heads. All the portions covered with black are, on the contrary, absolutely invisible in the glass, and the spectators

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cannot see that they exist. The phenomenon is, on the whole, a curious application of the effects of reflection which were in fashion some twenty years ago under the name of "living ghosts," and by means of which it was possible in theaters to cause the apparition, alongside of living persons, either of undecided forms or of bodies not resting on the ground.

The "Gingerbread" Fair this year showed a two-headed woman produced by a slightly different process, the body and head of the woman being seen directly, and the second head alone being seen by reflection from a glass. This phenomenon may be varied to infinity, so to speak. To cite only a few examples, there may be produced by the same process a decapitated person who talks; a decapitated person who holds his head in his hand, and a Judith and Holofernes, the head of the latter being held by the hair by the former.—*La Nature.*

The Mysterious Voice.

"Some time ago," says a correspondent of *La Nature*, "I was walking around in a side show in which were exhibited mechanical portraits,

FIG. 1.—THE SPEAKING HEAD.

when I was surprised to hear myself called: 'Monsieur! Monsieur!' * * * I discovered that the voice came from a tin trumpet, which was held in the mouth of a negro's head made of wood, and suspended by a small brass chain from semicircles of iron supported by a wooden frame" (Fig. 1). The effect produced on the spectators by this speaking head was one of universal astonishment, and no one was capable of solving

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the mystery. The arrangement for producing the illusion is very simple, however, and is thus explained by the writer above referred to:

A person hidden behind the scenes speaks into a tube two or three centimeters in diameter which runs from that point to the wooden frame, and in the interior of the horizontal and upright pieces of which

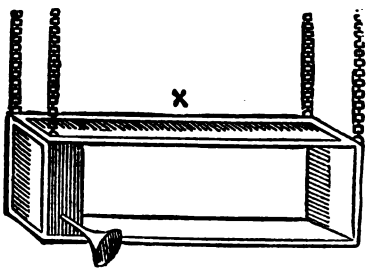

FIG. 2.—THE SPEAKING GLASS CASE.

it passes till it reaches the suspended head at A, as shown by the dotted lines, E, D, C, B, A. The voice thus transmitted is reflected from the sides of the trumpet, H, to the person holding a conversation with the head.

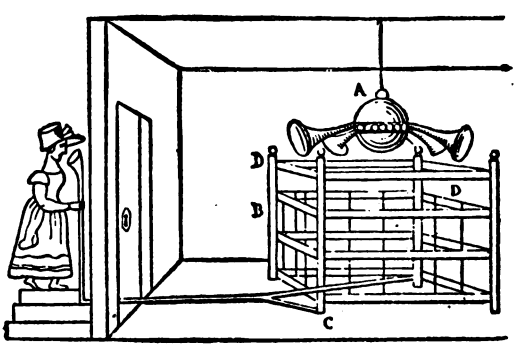

FIG. 3.—THE INVISIBLE GIRL EXPERIMENT.

This experiment, which is analogous to the one that precedes, was explained by Nicholson, in 1832, in his *Journal de Physique*. Although at first offered as a physical experiment, under the title of an "experiment in acoustics," it has since changed name and master, and is now dignified by the imposing nam of "invisible girl."

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Fig. 2 shows the arrangement of the original apparatus, which consisted of a glass case, X, about four feet long by about one in height, suspended from the ceiling by four chains at a distance of a foot from the window frame. From the extremity of the case projected a speaking trumpet, and the entire apparatus was surrounded by a latticework of iron wire to prevent its being touched by the hands of the curious. The phenomenon, although a puzzling novelty at the time, did not attract much of a crowd, as it was not managed with sufficient address, and the surroundings were not of a nature to please fashionable people. This apparatus was improved upon and rendered more elegant in appearance by Prof. Robertson. Fig. 3, copied from an old engraving, shows this latter arrangement. A globe, A, made of glass or enameled sheet iron, and to which are attached four trumpets, is suspended from the middle of the room. This globe is not necessary for the experiment, but is only an accessory to impose upon the imagination. Around it is placed a framework, B, which is very necessary, for it is hollow, and it is through it that the voice of the invisible person is heard. A tin tube passes through the upright C and then runs to D, where there is a small slit or aperture opposite the trumpet. This tin tube passes under the floor of the room, and runs into the neighboring room, whence the pretended invisible person speaks, and sees everything through the keyhole or through an aperture in the wall. This is all there is of the mystery.

An Improved Psycho.

Let me explain to those who have not seen "Psycho" that it consists of a small figure dressed as a Turk, sitting cross-legged (as shown by dotted lines) on a chest; this chest is in turn supported on a glass tube, about 12 in. in diameter and 3 ft. long, which rests on a four-legged stool. The bottom of chest and top of stool are covered with green cloth, so as to make a tolerably air-tight joint. The right arm is extended as per drawing, and a semicircular rack, in which are placed the 13 cards dealt to "Psycho," is fixed by means of a bracket (not shown) in such a position that the edges come between the finger and thumb, as shown at *. The arm turning horizontally on the pivot A, the hand can be brought over any card, and by closing the finger and thumb and raising the arm the card will be withdrawn from the rack and held in the air.

In Figs. 1 *a* and 1*b* (elevation and plan) the wheels E and M have each a train of clockwork (left out for the sake of clearness), which would cause them to spin round if unchecked. M, however, has two pins, *p p'*, which catch on a projection on the lever, N. E is a crown-wheel escapement—like that in a bottle roasting-jack—which turns A alternately to the left and right, thus causing the hand to traverse the 13 cards. A little higher on A will be seen a quadrant B (see plan) near the edge of which are set 13 little pins. The end of the lever N drops

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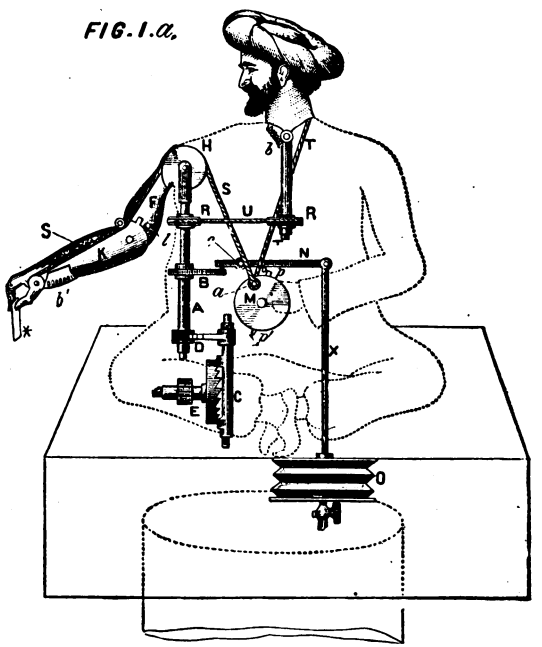
between any two of them, thus causing the hand to stop at any desired card. The lever being pivoted at *c* it is obvious that by pressing the end, N, B will be set at liberty, and the hand will move along the cards; by slightly raising it this motion will be arrested; by raising it still more the pin *p* is released and M commences to revolve, and by again depressing N this wheel will in its turn be stopped. Near the bottom of the apparatus is a bellows O, which contains a spring tending to keep the lever N, with which it is connected by a rod X, in the position shown.

FIG. 1.a.



This is connected with the tubular support, which may be connected by a tube through the leg of the stool, and another tube beneath the stage, with an assistant behind the scenes. By compressing or exhausting air through this tube it is obvious that the lever, N, will be raised or depressed, and the clockwork set going accordingly. *a* is a crankpin set in M, and connected with the head by catgut, T, and with the thumb by S.

At R and R' are two pulleys connected by gut. Thus if the hand moves round the head appears to follow its motions, and when raised by

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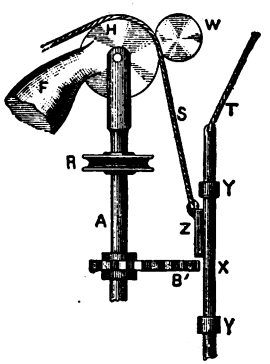
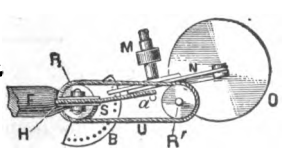
pulling S the head rises also by means of T. Further explanation seems almost unnecessary; *l* is a stop to prevent the elbow moving too far, and *b b* spiral springs to keep thumb open and head forward respectively. When N is raised M pulls T and S, the latter closing thumb, and then raising arm by pulley H. If the lever is allowed to drop *p* will catch and keep arm up. On again raising N the arm will descend.

FIG. 2. a.



Figs. 2*a* and 2*b* show another and simpler arrangement, in which only one train of clockwork is used. On the same axle as H is fixed a lever and weight, W, to balance the arm. A vertical rod, X, having a projection, Z, slides up and down in guides, Y Y, and carries the catgut S and T. The quadrant, B, has cogs cut, between which Z slides and stops the motion of A, which is moved, as before, by clockwork. The

FIG. 1. b.



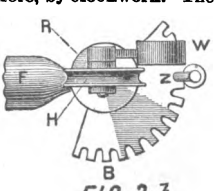


FIG. 2. b.

lower part of X is connected direct with O. When X is slightly raised, as shown, A is free to move, but on exhausting air and drawing X down Z enters the cogs and stops the hand over a card; continuing to exhaust the thumb closes and the card is lifted up. The details of the clockwork I leave to the ingenuity of your readers. There should be a fan on each train to regulate the speed. The figure should be so placed that

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your assistant can see the cards in the semicircular rack.—*English Mechanic.*

Magic Cabinets, Boxes, Etc.

Magic cabinets are much employed by magicians. The following is an example of one of the scenes that may occur with them:

When the curtain rises there is seen in the center of the stage a large dark colored cabinet, ornamented with mouldings, and mounted upon legs that are a little longer than those of ordinary cabinets, the object being to remove all possibility of a communication with the stage be-

FIG. 1.

neath. These legs are provided with casters. The showman turns this cabinet around and shows that there is nothing abnormal about it externally. He then asks some of the spectators to come up close to it, and lets them examine its interior, which is entirely empty. There is no double bottom, nor any hiding place. When the witnesses have made themselves certain of this fact they station themselves around the stage, and a certain number of them even consent to remain behind the cabinet and see nothing of the experiment. The cabinet being thus surrounded on all sides, and even one being able to look under it, fraud would seem to be an impossibility.

A young woman dressed as a danseuse then comes onto the stage and enters the cabinet (Fig. 1), and the doors are closed upon her. In a few moments the doors are opened again, when, lo and behold! the closet is

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empty, the young woman having disappeared. Then the doors are closed again, and then opened, and the danseuse makes her appearance; and so on. At the end of the experiment the witnesses examins the cabinet again, and, finding nothing changed therein, are justly stupefied.

In another style of cabinet there is no bar in the center, as shown in Fig. 1, but there is observed on one of the sides in the interior a bracket a few centimeters in length, and back and above this a shelf. This arrangement permits of performing a few experiments more than does the one just described. Thus, when the woman has disappeared the showman allows a young man to enter, and he also disappears, while the young woman is found in his place. This is a very surprising substitution.

The box into which the harlequin takes refuge, and which appears to be empty when Pierrot or Cassandra lifts the curtain that shields its entrance, is also a sort of magic cabinet.

In a series of lectures delivered a few years ago at the London Polytechnic Institution, a professor of physics unmasked the secret of some of the tricks employed on the stage for producing illusions, and notably

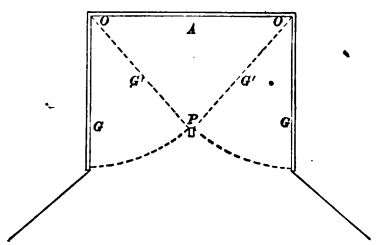

FIG. 2.—PLAN EXPLANATORY OF THE CABINET.

that of the magic cabinet. The lecturer, after showing the cabinet and causing the disappearance therein of an individual while the doors were closed, repeated the same experiment with the latter open. But in the latter case so quick was the disappearance that the spectators could not even then see how it was done.

The illusion produced by these apparatus is the result of a play of mirrors.

In the first cabinet described (Fig. 1), when the exhibitor has closed the doors upon the young woman, the latter pulls toward her two mirrors that are represented in Fig. 2 by the lines G G. These mirrors are hinged at O O, and when swung outward rest by their external edges against the bar P, and then occupy the position shown by the dotted lines G' G'. When the cabinet is again opened the woman, placed at A, is hidden by the two mirrors; but the appearance of the interior of the cabinet is not changed, since the spectators see the image of each side reflected from the corresponding mirror, and this looks to them like the back of the cabinet.

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The illusion is perfect. When the experiment is ended and the mirrors are again swung against the sides, at G G, the spectators see nothing but the backs of them, which are covered with wood; the cabinet is really empty, and no one can discover what modification has taken place in its interior during the disappearance of the woman.

In the second arrangement, which is shown in vertical section in Fig. 3, the young man gets up onto the shelf *c n*, at the upper part of the cabinet, by the aid of the bracket T, and then pulls down over him the mirror *b c*, which was fastened to the top of the cabinet. This mirror being inclined at an angle of 45 deg. reflects the top, and the spectators imagine that they see the back of the cabinet over the shelf just as they did before.

The box which the harlequin enters is based upon precisely the same principle. Its interior is hung with paper banded alternately blue and white. When the harlequin enters it he places himself in one of the

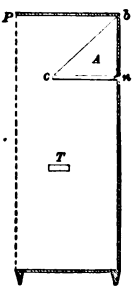

FIG. 3.—SECTION EXPLANATORY OF THE CABINET.

angles and pulls toward him two mirrors which hide him completely, and which reflect the opposite side of the box, so that the spectator is led to believe that he sees the back of it. In this case one of the angles at the back of the box is not apparent, but the colored stripes prevent the spectator from noticing the fact.

The Magic Portfolio.

This is an apparatus which an itinerant physicist might have been seen a few years ago exhibiting in the squares and at street corners. His method was to have a spectator draw a card, which he then placed between the four sheets of paper which, folded crosswise, formed the flaps of his portfolio. When he opened the latter again a few instants afterward the card had disappeared, or rather had become transformed. Profiting then by the surprise of his spectators the showman began to offer them his magic portfolio at the price of five sous for the small size and ten for the large.

The portfolio was made of two square pieces of cardboard connected

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by four strings, these latter being fixed in such a way that when the two pieces of cardboard were open and juxtaposed the external edge of each of them was connected with the inner edge of the other.

This constituted, after a manner, a double hinge that permitted of the portfolio being opened from both sides. To one pair of strings there were glued, back to back, two sheets of paper, which, when folded over, formed the flaps of the portfolio. It was only necessary, then, to open the latter in one direction or the other to render it impossible to open more than one of the two sets of flaps.

This device is one that permits of a large number of tricks being performed, since every object put under one of the sets of flaps will apparently disappear or be converted into something else, at the will of the prestidigitator (Fig. 4).

Magic Envelopes.

This trick is a simplification of the foregoing. The affair consists of

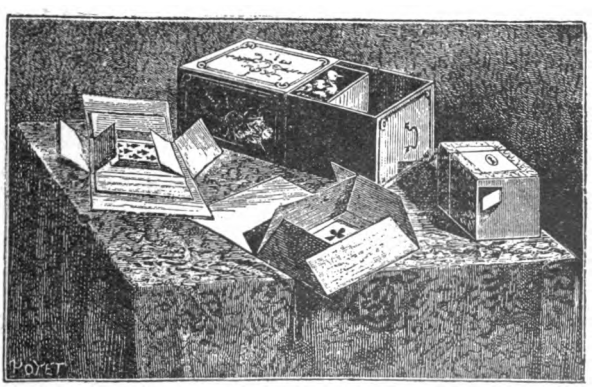

FIG. 4.—MAGIC PORTFOLIO, ENVELOPES, AND BOXES.

several sheets of paper of different colors folded over, one upon the other. A card inclosed within the middle envelope, over which have been folded all the others, is found to have disappeared when the flaps are opened again. The secret of the trick is very simple. One of the inner sheets of paper—the second one, usually—is double, and, when folded, forms two envelopes that are back to back. It is only necessary then to open one or the other of these latter to cause the appearance or disappearance or transformation of such objects as have been inclosed within it. (Fig. 4.)

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Magic Boxes.

Magic boxes are of several styles, according to the size of the objects that one desires to make disappear.

There is no one who has not seen a magician put one or more pigeons into the drawer of one of these boxes, and after closing it open it to find that the birds have disappeared. Such boxes contain, as shown in Fig. 4, two drawers, which, when pulled out, seem to be but one; and it is only necessary, then, to pull out the inner one or leave it closed in order to render the inclosed birds visible or invisible.

In order to cause the disappearance of smaller objects trick performers often employ a jewel box, and, after putting the object (a ring, for example) into this, they hand it to some person and ask him to hold it, requesting him at the same time to wrap it up in several sheets of paper. But this simple motion has permitted the performer to cause the ring to drop into his hand through a small trap opening beneath the box. Yet, while he is doing this, the spectators think that they hear the noise made by the ring striking against the sides of the box. But that is only a delusion; for the noise that is heard proceeds from a small hammer which is hidden within the cover under the escutcheon, and which is rendered immovable when the latter is pressed upon by the performer. The box can thus be shaken without any noise being heard within it, and the spectators are led to believe that the object has disappeared.

Double-bottomed boxes are so well known that it is useless to describe them. Sometimes the double bottom is hidden in the cover, and at others it rests against one of the sides. Such boxes permit of the disappearance or substitution of objects that are not very thick, such as a note, an image, or a card.—*La Nature.*

The Swinging Half Lady.

An arrangement is made similar to a hammock, which is attached to the back of the cabinet, and is then affixed to a false wooden bust made to fit the bust of the lady. It should be thickly padded where the part of her body rests upon it, and should be tightly strapped to the lady across the shoulders and back. The bust is covered with silk, satin, or any fine dress material, and trimmed to represent a lady's low-necked dress bodice with short shoulder sleeves. The remaining portion of the lady is encased in a dark-colored skirt (black velvet is the best), and her feet are firmly strapped to a wood rest at the back of the cabinet, as shown in Fig. 2. The bust is supported upon a swing, in the front of the cabinet. Four brass chains support a slab of wood about 28 inches long by about 8 or ten inches in width.

Midway up the chains at each side is a cross piece of wood fixed to the chains by which, when the lady grasps them with her hands, she can easily lift the bust from the wood slab, allowing a sword to be passed beneath the bottom of the bust and the top of the wood slab. When the

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lady is supported upon the swing she cannot swing *forward*, but can only swing with a slight *sideway* motion, because if she attempted to swing forward the slab of wood would then no longer support the bust, and the performer would be in danger of breaking her back, as she would have no other support to sustain her, except the back of the cabinet to which her feet are strapped.

The slab of wood forming the swing is made in some cases with two half-round holes, to allow the lady to place her hands through, to show that she can pass her hands beneath her.

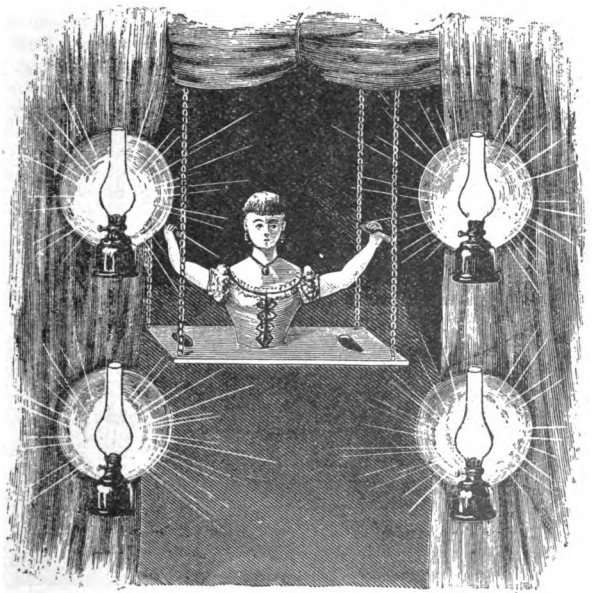

FIG. 1.

The interior of the cabinet should be of one uniform color, if possible of a dark blue or dark maroon. It should be about six feet in depth by about five to seven feet across the front, according to fancy. The front should have either *dark* blue, maroon, or green baize curtains, so made as to draw right across. On each side of the cabinet are affixed two lamps, as in Fig. 1, with large plated reflectors about 10 or 12 inches in diameter. These should be so fixed that the curtains can be drawn at

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the back of them; and thus, when lighted, reflect a strong and powerful light *outward*, throwing the interior of the cabinet into deep and gloomy shadow. It must be evident, therefore, to the reader that the four lamps and reflectors play a very important part in making this illusion perfect, because in consequence of a strong, bright, and dazzling light being reflected into the eyes of the spectators it is impossible for them to distinguish anything inside the cabinet, beyond the bust and head of the lady.

The position for the lady performing is one of pain. In the first

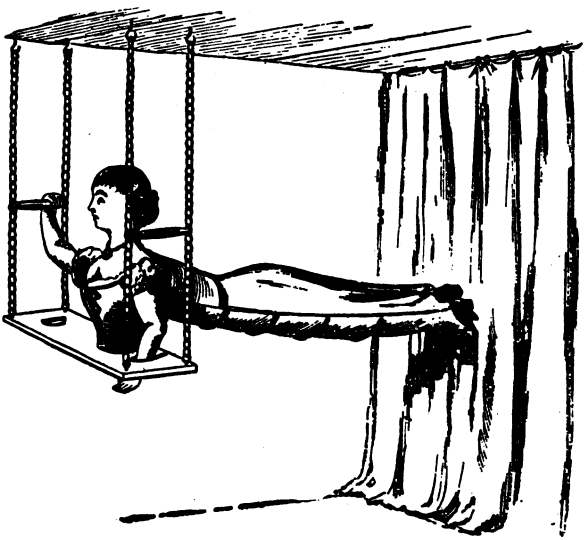

FIG. 2.

place she has to be tightly strapped to the bust, which causes difficulty in breathing and talking; and, again, the head must be held well back to make it appear from the front as if the false bust and neck were completely one and upright.

Many ladies performing this illusion cannot help showing in their look the pain and suffering they are experiencing even when before their audiences, thereby spoiling the effect the illusion would have had if their features had been composed and the face wreathed with smiles.

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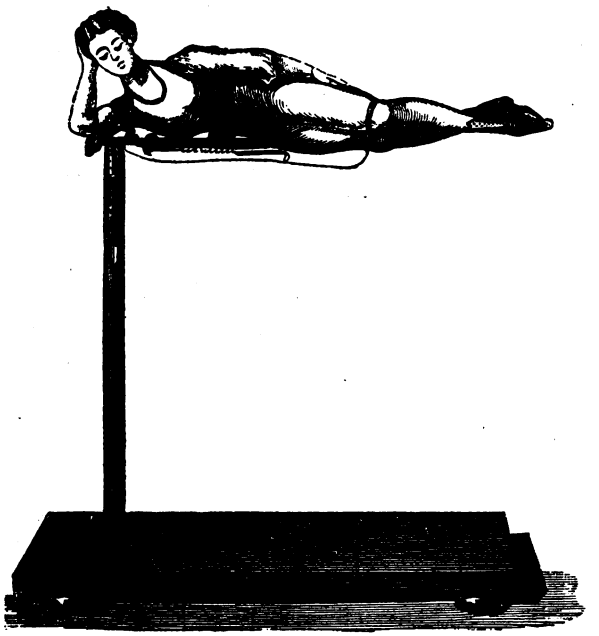
The Aerial Suspension.

This trick has been before the public for many years, but when performed still causes considerable sensation. The apparatus required is, first, a kind of iron corset, for which the performer doing this trick must be properly measured and accurately fitted with it, according to his or her size and build. This corset is strapped upon the body, and



attached to it is a rod passing down the right side from beneath the arm, almost to the right knee. Below the arm is a projecting piece so made as to fit into a socket, and almost in the shape of a crutch; and the rod passing down the side of the performer is so constructed that when a person has this apparatus strapped securely upon him or her, and the projecting piece under the arm is fitted into the socket of the pole, the body can be raised, and the toes in rising will describe an arc of about 90 deg., assuming the position shown in the figure. To effect this two poles are required of the same length, one made of wood and the other

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of iron; the latter being fitted into a socket in the stand, and having also a socket in the top, in which is fixed the projecting piece under the arm, and this rod therefore supports the whole weight of the body during the performance. The two poles are both painted the same color, and to the audience both appear to be the same.

The performer will have to provide a specially made costume to suit the working of the apparatus. The young lady (we will imagine that it is a lady who performs this suspension feat) is brought forward by the professor, and the two rods are shown, and a stool is placed on the stand on which the lady steps. The iron rod is now placed in position and fixed under the right arm, and the wood rod is placed under the left; the professor, now making a few passes with his hands, apparently sends the lady performer into a mesmeric sleep, and gently draws the rod from under the left arm and lays it down. Making a few more passes he gradually raises the body of the lady into a horizontal position, and she will appear to be suspended almost in the air. With a little practice the body can be placed into any position. When the lady has been suspended long enough, make a few more passes and gently lower the body until in an upright position, and again place the wood rod under the left arm and place the stool beneath her feet, and taking a handkerchief wipe the lady's face, and she will appear to awaken and will step down from her exalted position.

An improvement has lately been introduced in the apparatus; the iron column is hollow, and through the center another rod is worked from beneath the stage, and in the socket of the iron rod at the top are placed a number of teeth which catch corresponding teeth in the projecting piece under the arm, and this being worked from below the stage will cause the body of the lady to slowly rise into a horizontal position without being so placed by the professor. This is certainly a very great improvement in the mode of working, as while the professor simply makes a few passes with his hands the body gradually rises, apparently to the audience without any visible means whatever.

The Ghost Illusion.

This illusion, which created so much sensation in London and first known here as "Pepper's Ghost," I will endeavor to explain, and make the working of it as clear as I possibly can to the reader. It is caused by the figure of a man or woman being reflected upon a sheet of glass, and the audience looking through this glass, apparently see the figure upon the stage, but in reality it is not so, being only upon the glass. In the first place a sheet of plate glass perfectly clear and without a blemish must be procured, and of such a size that it will show the image or reflection of the performer who impersonates the ghost. This glass is fixed at the front of the stage and inclined slightly toward the audience. In front and below the stage a chamber is made, completely concealed

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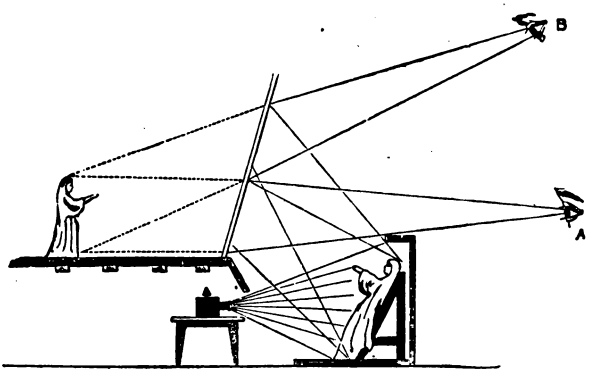
from the eyes of the audience, but having an opening at the upper part, through which the reflection of the person below is thrown upward upon the sheet of glass. The reader can understand the position better by referring to the accompanying cut. The body of the person to be reflected is against an inclined plane, which is covered with black cloth. This inclined plane is fixed upon castors, and the person leaning against it, moving this slightly with his feet, either to the right or left, will cause it to appear as if the ghost was either walking forward or backward. Below the stage a person is placed with a powerful lantern, and the light from it is thrown upon the figure representing the ghost, thus causing it to be reflected strongly and brightly against the glass fixed above. The stage must be darkened and dimly lighted, otherwise the ghost will hardly be visible. In making various motions of the body the ghost actor must reverse his movements; for example, if he raises



his left arm the figure reflected above will appear to raise its right arm. The glass, as I stated before, must be without a blemish, and fixed at an angle of 20 deg., inclining forward toward the audience, and the nearer the audience are seated to it the larger the glass must be. The size of the glass depends upon the height of the figure to be reflected and the size of the stage and the theater or hall in which it is exhibited. This again will be understood by referring to the figure, in which A represents the eyes of that part of the audience seated in the lower portion or body of the hall, while B represents the eyes of those who are seated in the boxes or gallery, thus showing the angle by which the height of the glass is determined, as the angles of incidence are always equal to the angles of reflection; and the same angles of incidence are likewise equal to the corresponding angles of the reflected figure.

This illusion was invented in 1863 by Prof. Pepper, by whom it was patented, and for a long period it was exhibited at the Polytechnic in

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London, in various forms and guises, and drew thousands from all parts to see this wonderful exhibition. Although it cannot now be classed as a "novelty," yet it still creates a great sensation whenever and wherever it is exhibited.

[If the reader desires to pursue this subject further he is referred to "The Art of Modern Conjuring," by Prof. Henri Garenne, to whom we are indebted for much that we present here. Ward, Lock & Co., publishers, New York and London.]

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PART III.—MEDICAL.

Prescriptions of Eminent Physicians.

ARRANGED AND REVISED BY

FRANK V. LUSE, M. D., Chicago, Ill.

AUTHORITIES.

Agnew.
Atthill.

Bartholow.
Basham.
Beasley.
Bibron.
Brande.
Browne.
Brown-Sequard.

Chapman.

Da Costa.
Dewees.

Ellis.

Fenner.

Gerhard.
Getchell.
Gross.
Guy.

Hartshorne.
Hazard.
Hebra.

Liebreich.
Luse.

Mackenzie.
Milton.
Mitchell, R. W.

Pancoast.
Porcher.

Ricord.
Ringer.

Schafhirt.
Smith.
Squibbs.

Tanner.
Thornton.
Trousseau.

Waring.

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Albuminuria (Bright's Disease).

℞ Tincturæ Ferri Chloridi.....f ℥iij.
Acidi Acetici diluti.....f ℥ij.
Syrupi simplicis.....f ℥iss.
Liquoris Ammonii Acetatis.....q. s. ad f ℥iv.—M.

Sig. Take a dessertspoonful every six hours. *Basham.*

Alcoholism (Chronic).

℞ Tincturæ Capsici.....
Tincturæ Zingiberis.....ää f ℥j.
Tincturæ Valerianæ ammo.....
Tincturæ Gentianæ comp.....ää f ℥ij.—M.

Sig. Take a dessertspoonful in a teacupful of hop tea three or four times a day. *Gerhard.*

Amenorrhœa (Absence of Menstrual Flow).

℞ Myrrhæ.....gr. viij.
Pulveris Jalapæ.....gr. xv.
Ferri Sulphatis exsiccatæ.....
Pulveris Aloes et Canellæ.....ää ℥j.
Syrupi simplicis.....q. s.

Fiat massa et divide in pilulas l.

Sig. Take two or three pills at bedtime, for several nights successively. *N. Chapman.*

Asthma.

℞ Potassii Iodidi.....℥iij.
Extracti Belladonnæ fluidi.....f ℥j.
Extracti Lobeliæ fluidi.....f ℥ij.
Extracti Grindeliæ fluidi.....f ℥ss.
Glycerinæ.....
Aquæ destilatæ.....ää f ℥iss.—M.

Sig. Take a tablespoonful every two, three, or four hours, as necessary. *Bartholow.*

℞ Foliorum Belladonnæ.....
Foliorum Hyoscyami.....ää gr. iij.
Extracti Opii aquosi.....gr. one-fifth.
Aquæ Laurocerasi.....q. s.

Moisten the leaves with a solution of the opium extract in the cherry-laurel water. Let them dry thoroughly and roll into a cigarette. Two to four of these cigarettes may be smoked every day. *Trousseau.*

Biliousness.

℞ Resinæ Podophilli.....gr. ¼
Resinæ Jalapæ.....
Extracti Colocynthidis compositi.....
Gambogiæ.....ää gr. iiss.
Olei Juniperi.....q. s.

Misce et fiant pilulæ No. ii.

Sig. One dose, at bedtime. *Guy.*

Burns and Scalds.

℞ Plumbi Carbonatis.....℥iv.
Olei Lini.....q. s.
Tere simul et fiat pinguentum.

Sig. Apply liberally on linen or lint. *Gross.*

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℞ Acidi Salicylici.....ʒj
Olei Olivæ.....f ʒviij.—M.

Sig. Apply to burn, covering with linen or lint. *Bartholow.*

Biliary Calculi (Stone in the Bile Duct).

℞ Chloroformi purificati.....ʒij.
Olei Cinnamomi.....gtt. viij.
Spiritus Camphoræ.....
Tincturæ Opii deodoratæ.....ää f ʒiss.
Spiritus Vini.....f ʒiij.—M.

Sig. Dose, from five to thirty drops, in sweetened water, every hour or two. *Hartshorne.*

Renal or Vesical Calculi (Stone in Kidney or Bladder).

℞ Liquoris Potassæ.....f ʒss.
Tincturæ Humuli.....f ʒiss.
Infusi Calumbæ.....f ʒiv.
Syrupi Aurantii Corticis.....f ʒij.

Fiat mistura.

Sig. Take a tablespoonful three times daily. *H. Green*

Cancer.

℞ Arsenici Iodidi.....gr. j.
Extracti Conii.....ʒij.

Fiat massa, et divide in pilulas xvi.

Sig. Take one pill morning and night. *Marsden.*

Carbuncle.

℞ Quininæ Hydrochloratis.....gr. xxiv.
Potassii Chloratis.....ʒij.
Acidi Hydrochlorici.....ɱ xl (!)
Tincturæ Ferri Chloridi.....f ʒij.
Tincturæ Cardamomi.....f ʒiss.
Aquæ destillatæ.....q. s. ad f ʒvj.—M.

Sig. Take a tablespoonful every three hours, diluted. *Gerhard.*

Nasal Catarrh.

℞ Sodæ carbonatis.....
Sodæ biboratis.....ää ʒ ij.
Liq. sodæ chlorinatæ.....ʒ ss.-ʒij.
Glycerini.....ʒ j.
Aquæ.....ad ʒ vj.—M.

Sig. Apply cold by means of a hand-spray apparatus.

Pugin Thornton.

℞ Borax.....ʒ iij.
Salicylic acid.....ʒ ij.
Glycerine.....ʒ ijss.
Water, to make.....ʒ iij.

Sig. From one to two drachms in one-half pint of water, applied by means of a douche. Is especially useful in catarrh with ulceration, usually due to syphilis.

For simple catarrh use the following:

℞ Chloride of ammonium.....
Borax.....ää gr. x.
Aquæ.....Oss.—M.

Sig. Use with a douche, spray-producer, or by means of insufflation.

Lennox Browne.

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Cholera.

℞ Tinct. Opii.....
Tinct. Capsici.....
Spts. Camphoræ.....ää ʒj.
Chloroformi.....ɨ ʒiij.
Alcoholis.....q. s. ad. ʒv.—M.

Sig. Dose five drops to one teaspoonful. *Squibbs.*

In time of epidemic cholera, or diarrhœa, when any person has two movements of the bowels more than natural within the twenty-four hours, the second one should be followed by a dose of this mixture to be repeated after every movement that follows. If the movements increase in frequency or in copiousness after the second dose of the medicine has been taken a physician should be sent for at once, and a double dose be taken after each movement until he arrives. Immediately after taking the first dose the person should go to bed and remain there for twelve hours after the diarrhœa has entirely ceased.

℞ Acidi Sulphurici.....ℨss.
Morphinæ Sulphatis.....gr. ɨ.
Spiritus Vini Gallici.....f ʒiss.
Aquæ destillatæ.....f ʒiij.—M.

Sig. Inject under the skin of the arms, legs, and over the stomach every hour until the symptoms are relieved. (*When rice-water discharges, vomiting, cramps, and shrinkage of the extremities supervene.*)
R. W. Mitchell, Memphis, Tenn.

℞ Creasoti.....gtt. j.
Aquæ Camphoræ.....
Infusi Gentianæ compositi.....ää f ʒvj.—M.

Sig. One dose every two hours. (*In the cold stage.*)
J. T. Jones, Nashville, Tenn.

Cholera Infantum.

℞ Plumbi Acetatis.....gr. viij.
Acidi Acetici diluti.....gtt. vj.
Tincturæ Opii deodoratæ.....gtt. iv.
Syrupi simplicis.....
Aquæ Menthæ piperitæ.....ää f ℨss.—M.

Sig. Dose a teaspoonful every two or three hours. (*For a child two years old.*) *Da Costa.*

℞ Cannabis Indicæ.....gr. j.
Pulveris Opii.....gr. ss.
Camphoræ.....gr. ij.

Misce et fiat pilula.

Sig. Take at bedtime. *Lombe Atthill.*

Constipation.

℞ Extracti Stillingiæ fluidi.....f ʒv.
Tincturæ Belladonnæ.....
Tincturæ Nucis Vomicæ.....
Tincturæ Physostigmatis.....ää f ʒj.—M.

Sig. Dose, twenty drops in water, three times a day before meals. (*In habitual constipation.*) *Bartholow.*

℞ Cascara Cordial.....ʒij.

Sig. Teaspoonful three times a day before meals. *Luse.*

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General Debility.

℞ Pulveris Aloes Socotrinæ.....ʒj.
Pulveris Zedoariæ.....
Pulveris Gentianæ.....
Croci.....
Pulveris Rhei.....
Agarici.....ää ʒj.
Spiritus Vini Gallici.....Oij.
Macera per dies septem, cola, et adde—
Syrupi simplicis.....f ʒij.—M.

Sig. Dose, a tablespoonful three times a day in water. (This is the celebrated Baûme de Vie, or Elixir of Life.)

Delirium Tremens.

℞ Quininæ Hydrochloratis.....ɔij.
Acidi Hydrochlorici diluti.....f ʒiss.
Syrupi Zingiberis.....f ʒiss.
Aquæ destillatæ.....q. s. ad f ʒiv.—M.

Sig. Dose, a dessertspoonful in hop tea every two hours. (*In the preliminary stage known as horrors.*) *Gerhard.*

℞ Chloral Hydratis.....ʒss.
Aquæ destillatæ.....f ʒij.—M.

Sig. One dose. (*To enforce sleep.*) *Liebreich*

℞ Antimonii et Potassii Tartratis.....gr. j.
Tincturæ Aconiti Radicis.....f ʒss.
Tincturæ Opii.....f ʒij.
Aquæ destillatæ.....q. s. ad f ʒiv.—M.

Sig. Dose, a dessertspoonful in porter every two or three hours. (*In strong and robust patients with boisterous delirium.*) *Ringer.*

Diarrhœa (Children.)

℞ Bismuthi Subnitratis.....gr. x.
Pulveris Calcii Phosphatis.....gr. xij.
Sacchari Lactis.....ʒss.

Misce et fiant chartulæ No. x.

Sig. One powder after each evacuation. (*In wasting diarrhœa of children.*) *Hazard.*

℞ Sodii Bicarbonatis.....ʒss.
Tincturæ Catechu.....f ʒij.
Syrupi Rhei aromatici.....
Tincturæ Cinchonæ compositæ.....ää f ʒss.
Tincturæ Opii camphoratæ.....f ʒj.—M.

Sig. Dose, for a child two or three years old, a teaspoonful every two or three hours. *Getchell.*

Diarrhœa (Adults).

℞ Cupri Sulphatis.....
Morphinæ Sulphatis.....ää gr. j.
Quininæ Sulphatis.....gr. xxiv.

Misce et fiant pilulæ No. xii.

Sig. Take one pill three times a day. (*In chronic cases*).
Bartholow

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℞ Pulveris aromatici.....℥iij.
Spiritus Ammonii aromatici.....f ℥iij.
Tincturæ Catechu.....f ℥x.
Tincturæ Cardamomi compositæ.....f ℥vj.
Tincturæ Opii deodoratæ.....f ℥j.
Misturæ Cretæ.....q. s. ad f ℥xx.—M.

Sig. Dose, eight drachms for an adult; four drachms for a child of twelve years; two drachms for seven years old, after each liquid motion. (*General cholera and diarrhœa mixture.*) *HeneryBeasley*

Dysentery.

℞ Tincturæ Opii deodoratæ.....f ℥ij.
Vini Ipecacuanhæ.....f ℥ij.
Olei Ricini.....f ℥ij.
Pulveris Acaciæ.....
Sprupi simplicis.....
Aquæ Cinnamomi.....ää q. s.

Fiat emulsio, secundum artem, ad f ℥vj.

Sig. Take a tablespoonful every two hours. *Gerhard.*

℞ Tincturæ Hamamelis.....f ℥ss.
Elixiris simplicis.....f ℥iiiss.
Syrupi simplicis.....f ℥ss.
Aquæ destillatæ.....f ℥j.—M.

Sig. Dose, a teaspoonful every two or three hours. (*Where there is much blood.*) *Ringer.*

Dysmenorrhœa (Difficult Menstruation.)

℞ Camphoræ.....ʒj.
Alcoholis.....q. s. ut fiat pulvis.
Dein adde—
Pulveris Acaciæ.....
Sacchari albi.....ää ℥j.
Aquæ Cinnamomi.....f ℥j.

Fiat mistura.

Sig. Dose, the one-half the instant pain is felt; if not relieved in an hour or two, give the remainder. *Dewees.*

℞ Extracti Gelsemii fluidi.....f ℥iiss.
Elixiris simplicis.....f ℥vss.
Syrupi Aurantii Corticis.....f℥j.—M.

Sig. Take a teaspoonful every two hours. *Porcher.*

℞ Tincturæ Opii deodoratæ.....f ℥ij.
Extracti Cimicifugæ.....f ℥ss.
Syrupi simplicis.....f ℥x.—M.

Sig. Take a teaspoonful every three or four hours. (*To restore the menstrual flow after suddenly checked.*) *Ringer.*

Dyspepsia.

℞ Pulveris Radicis Rhei.....℥j.
Pulveris Aloes.....ʒij.
Sodii Bicarbonatis.....℥ij.
Valerianæ contusæ.....
Serpentariæ contusæ.....
Gentianæ contusæ.....
Quassiæ contusæ.....ää ℥ss.
Spiritus Frumenti.....Oij.

Macera in vaso leviter clauso per horas bis quatuor viginta, et cola.

Sig. Dose, a wineglassful three times a day. *Liebreich.*

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Epilepsy.

℞ Ammonii Bromidi.....
Potassii Iodidi.....ää ʒviij.
Potassii Bromidi.....ʒvj.
Sodii Bicarbonatis.....ʒij.
Tincturæ Calumbæ.....f ʒij.
Aquæ destillatæ.....f ʒvj.—M.

Sig. Take a dessertspoonful after each meal, and a tablespoonful at bedtime. *Brown-Sequard.*

Eyes (Inflammation of).

℞ Morph. Sulph.....gr. iij.
Zinci Sulph.....gr. ij.
Aquæ destillatæ.....ʒj.—M.

Sig. Apply two drops directly to the eye. *Luse.*

Frost-bite.

℞ Iodi.....ʒj.
Potassii Iodidi.....gr. iv.
Aquæ destillatæ.....℥vj.
Adipis.....ʒj.—M.

Sig. Apply once daily. (*With unbroken skin.*) *Hebra.*

℞ Fellis Bovini recentis.....f ʒiij.
Balsami Peruviani.....f ʒj.—M.

Sig. Apply two or three times a day. (*With broken or unbroken skin.*) *Hugh Smith.*

Gonorrhœa and Gleet.

℞ Liquoris Potassæ.....f ʒj.
Balsami Copaibæ.....f ʒss.
Tincturæ Cubebæ.....f ʒvj,
Liquoris Morphinæ Sulphatis.....f ʒj.
Aquæ Camphoræ.....q. s. ad f ʒvj.—M.

Sig. Take a tablespoonful four times a day. *D. Hayes Agnew.*

℞ Hydrastinæ.....ʒj.
Mucilaginis Acaciæ.....f ʒiv.—M.

Sig. A half ounce as an injection. (*In chronic gonorrhœa and gleet.*) *Bartholow.*

℞ Zinci Sulphatis.....
Acidi tannici.....ää gr. xv.
Aquæ Rosæ.....f ʒvj.—M.

Sig. A half ounce as an injection two or three times daily. (*In gleet.*) *Ricord.*

℞ Morphinæ Acetatis.....gr. vj.
Plumbi Acetatis.....
Zinci Sulphatis.....ää gr. viij.
Creasoti.....gtt. viij.
Aquæ destillatæ.....f ʒvj.—M.

Sig. As an injection twice daily. *H. H. Smith.*

℞ Zinci Sulphatis.....ʒj.
Aluminis.....ʒiij.—M.

Sig. Dissolve a teaspoonful in one pint of water and inject three times a day. (*In females.*) *Hazard.*

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Hay Fever.

℞ Potassii arsenitis.....gr. xv.
Aquæ destillatæ.....f ℥j.
Solve.

Unsized white paper to be thoroughly moistened with this solution, cut into twenty equal parts, and each part rolled into a cigarette, two or three of which may be smoked daily. *Trousseau.*

℞ Tincturæ Aconiti Radicis.....f ℥iss.
Glycerini.....f ℥iiss.—M.
Sig. Apply to outside of nose. *Ringer.*

Headache (See Liniments).

℞ Ætheris.....
Spiritus Ammoniæ aromatici.....ää f ℥j.
Aquæ Camphoræ.....f ℥x.
Tincturæ Cardamomi compositæ.....f ℥j.
Misce pro haustu.
Sig. Take two to three times a day. (*In nervous headache*).
Brande.

℞ Atropinæ Sulphatis.....gr. ss.
Chinoidinæ.....℥j.
Misce et fiant pilulæ No. lx.
Sig. One pill twice or thrice a day, (*In sick headache.*)
Bartholow.

Hemorrhoids (Piles).

℞ Pulveris Jalapæ.....
Potassi Bitartratis.....
Potassii Nitratis.....ää ℥ss.
Confectionis Sennæ.....℥j.
Syrupi simplicis.....q. s.
Misce et fiat electuarium.
Sig. A bolus the size of a hazel-nut three times a day. *Ellis.*

℞ Fluid Ext. Ohio Buckeye.....℥j.
Fluid Ext. Horse Chestnut.....℥j.
Alcohol.....℥iv.
Water.....℥iv.
Simple Elixir.....℥vi.
Sig. Dose, one teaspoonful. *Mackenzie.*

℞ Olei Theobromæ.....℥ss.
Extracti Krameriæ.....℈ij.
Pulveris Opii.....gr. v.
Misce secundum artem, et fiant suppositoria No. x.
Sig. Use one morning and night. *J. Pancoast.*

Impotence and Sexual Debility.

℞ Pulveris Cantharidis.....gr. xviij.
Pulveris Opii.....
Pulveris Camphoræ.....ää gr. xxxvj.
Confectionis Rosæ.....q. s.
Misce et fiant pilulæ No. xxxvi.
Sig. Take one pill at night. (*From general debility.*) *Hazard.*

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℞ Extracti Vanillæ fluidi.....f ℥j.
Sig. Dose, a teaspoonful at night. (*In old people.*) *Gerhard.*

℞ Phosphori.....gr. ss.
Ætheris.....f ℥ss.
Solve, et adde—
Tincturæ Cantharidis.....
Tincturæ Nucis Vomicæ.....ää f ℥ss.—M.
Sig. Take thirty drops three or four times a day. *Vogt.*

℞ Fluid Ext. Damiana.....1 ounce.
Dialysed Iron.....½ ounce.
Tinct. Cantharides.....½ ounce.
Acid Phosphoric (diluted).....½ ounce.
Lemon juice.....½ ounce.
Glycerine.....2 ounces.
Simple Elixir, q. s. to make.....1 pint.
Sig. Dose, one teaspoonful three times a day. (*Useful in all cases of sexual debility. A most efficient nerve tonic.*) *Kilner's Formulary.*

Leuchorrhœa.

℞ Zinci Sulphatis.....
Aluminis.....ää ℥iss.
Glycerini.....f ℥vj.—M.
Sig. Add a tablespoonful to a pint of water and inject night and morning. *Hazard.*

Menorrhagia (Excessive Menstrual Flow).

℞ Tincturæ Ferri Chloridi.....f ℥iiss.
Acidi Phosphorici diluti.....f ℥iiiss.
Syrupi Acidi citrici.....q. s. ad f ℥iv.—M.
Sig. Take a dessertspoonful three times a day. (*When pale and debilitated.* *Gerhard.*

℞ Acidi Gallici.....gr. xv.
Acidi Sulphurici aromatici.....℥xv.
Tincturæ Cinnamomi.....f ℥ij.
Aquæ destillatæ.....f ℥ij.—M.
Sig. One dose, to be taken every four hours until bleeding ceases. (*In profuse bleeding,*) *Hazard.*

Neuralgia (See Liniments).

℞ Strychninæ Sulphatis.....gr. j.
Morphinæ Sulphatis.....
Acidi arseniosi.....ää. gr. iss.
Extracti Aconiti.....gr. xv.
Quininæ Sulphatis.....℥j.
Misce et fiant pilulæ No. xxx.
Sig. Take one pill three times a day. *S. D. Gross.*

Nymphomania (Excessive Sexual Desire).

℞ Potassii Bromidi.....℥vj.
Aquæ destillatæ.....f℥v.—M.
Sig. Three teaspoonfuls before dinner and four at bedtime.
Brown-Sequard.

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Rattlesnake Bite.

℞ Hydrargyri Chloridi corrosivi.....gr. ij.
Potassii Iodidi.....gr. iv.
Aquæ destillatæ.....℥v.
Solve et adde—
Bromi.....ʒv.—M.

Sig. Take ten drops in a tablespoonful of wine or brandy every fifteen or twenty minutes. (*Recommended by Bibron, Prince Paul of Wuertemberg, W. A. Hammond, and others.*) *Bibron.*

Rheumatism (See Liniments).

℞ Sodii Bicarbonatis.....ʒij.
Acidi Salicylici.....ʒiij.
Glycerini.....
Aquæ destillatæ.....āā f ʒij.—M.

Sig. One teaspoonful every four hours. *N. B. Kennedy.*

℞ Pulveris Guaiaci Resinæ.....
Potassii Iodidi.....āā gr. x.
Tincturæ Colchici Seminis.....f ℈ss.
Aquæ Cinnamomi.....
Syrupi simplicis.....āā q. s. ad f ʒj.—M.

Sig. A dessertspoonful to a tablespoonful thrice daily. (*In chronic rheumatism.* *Philadelphia Hospital.*

Sciatica.

℞ Extracti Belladonnæ.....gr. one-sixth.
Extracti Stramonii.....gr. one-fifth.
Extracti Cannabis Indicæ.....gr. i.
Extracti Aconiti.....gr. i.
Extracti Opii.....gr. i.
Extracti Hyoscyami.....gr. i.
Extracti Conii.....gr. j.
Pulveris Glycyrrhizæ.....q. s.

Misce et fiat pilula.

Sig. Take three, four, and even five pills a day. *pro re nata.* *Brown-Sequard.*

Spermatorrhœa (See Impotance).

℞ Quininæ Sulphatis.....gr. vj.
Acidi Sulphurici diluti.....f ʒj.
Tincturæ Cardamomi compositæ.....f ʒiij.
Aquæ Cinnamomi.....f ʒvss.—M.

Sig. Two tablespoonfuls twice daily. *Milton.*

℞ Pulveris Opii.....gr. v.
Camphoræ.....ɔiv.
Pulveris Acaciæ.....
Syrupi simplicis.....āā q. s.

Fiat massa in pilulas No. xl. dividenda.

Sig. Take two pills three times a day. *Waring.*

℞ Postassii Bromidi.....ʒj.
Aquæ destillatæ.....q. s. ad f ʒij.—M.

Sig. Take a teaspoonful three times a day. (*In the strong and plethoric*). *Bartholow.*

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Syphilis.

"Ricord's Mixture," which has been so highly recommended in syphilitic affections is composed as follows:

℞ Hydrarg. Iod. rub.....gr. iv.
Potass. Iod.....ʒj.
Fl. Ext. Sarsap. comp.....ʒij.
Aquæ.....q. s. ad ʒv.—M.
Sig. Teaspoonful.

℞ Potass. Iodid.....ʒij.
Hydrarg. Biniodid.....gr. ss.
Syr. Aurant. Cort.....ʒj.
Tinct. Aurant. Cort.....ʒj.
Aquæ.....ad ʒiv.—M.
Sig. Teaspoonful in water after eating. (*Mixed treatment.*)

Keyes.

℞ Hydrarg. Chlor. Corros.....gr. ij.
Potassii Iodidi.....ʒij.
Tr. Cinchona Co.....ʒij.
Aquæ dist.....ʒij.—M.
Sig. Take one drachm three times a day. Discontinue when gums get sore and resume again when soreness is gone. *Luse.*

℞ Acidi Nitro-Muriatici diluti.....f ʒiiss.
Syrupi Stillingiæ compositi.....f ʒxiiiss.
Aquæ destillatæ.....f ʒij.—M.
Sig. Dose, one to two teaspoonfuls three times a day, with denutrition. (*In cases saturated with the approved remedies, but still presenting patches on the skin and mucous membranes.* *Bartholow.*

Tapeworm.

℞ Granati Corticis Radicis.....ʒss.
Seminum Peponis.....ʒj.
Extracti Filicis maris ætherei.....f ʒj.
Pulveris Ergotæ.....ʒj.
Pulveris Acaciæ.....ʒij.
Olei Tiglii.....ɱij.
Thoroughly bruise the granate bark and pumpkin-seed, and with the ergot boil in eight ounces of water for fifteen minutes, and strain through a coarse cloth. Rub up well the croton oil and extract of male fern with the acacia, and form into an emulsion with the decoction. Take at one dose at 10 o'clock in the morning, having eaten no breakfast and having taken a full dose of Rochelle salts the previous night. This expels the worm alive and entire within two hours, the head firmly fastened to the side of its own body. *Schafhirt.*

℞ Pulveris Kamalæ.....gr. v-x.
Syrupi Aurantii Florum.....f ʒss.
Mucilaginis Tragacanthæ.....ʒj.
Aquæ destillatæ.....f ʒj.
Misce et fiat haustus.
Sig. Take early in the morning four hours after a purge. (For a child two to five years. *Tapeworm.*). *Tanner.*

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SYMBOLS OR SIGNS USED IN PRESCRIPTIONS.

℥. Minim, 1-60 part of a fluid drachm.
gtt. Gutta, drop; guttæ, drops.
℈j. Scrupulus vel scrupulum, a scruple=20 grains.
ʒj. Drachma, a drachm=60 grains.
f℥j. Fluidrachma, a fluid or measured drachm.
℥j. Uncia, a troyounce=480 grains.
f℥j. Fluiduncia, a fluidounce.
lbj. Libra, a pound, understood in prescription to apply to an fficinal pound of 5,760 grains.
Oj. Octarious, a pint.
gr. Granum, a grain; plural grana, grains.
ss. Semis, half, affixed to signs as above.

PHRASES AND ABBREVIATIONS USED IN PRESCRIPTIONS.

LATIN WORD.	ABBREVIATION.	TRANSLATION.
Ad		To, up to.
Ad libitum	Ad lib	At pleasure.
Adde	Add	Let it or them be added.
Ampulla		A large bottle.
Ana	A ää	Of each.
Aqua-bulliens	Aq-bull	Water—boiling.
Aqua-fervens	Aq-ferv	Water—hot.
Aqua-destillata	Aq dest	Water—distilled.
Bene		Well.
Bis in dies	Bis ind	Twice daily.
Bulliat, bulliant	Bull	Let boil.
Cape. Capiat	Cap	Take, Let him take.
Capsula	Caps	Capsule.
Ceratum	Cerata	A Cerate.
Charta (*Karta*)	Chart	A paper (medicated).
Chartula (*Kartula*)	Chart	A little paper for a powder.
Cibus	Cib	Food.
Cochleare magnum	Coch mag	A tablespoon.
Cochleare parvum	Coch parv	A teaspoon.
Cola. Colatus	Col	Strain, Strained.
Collyrium	Collyr	An eye wash.
Collutorium	Collut	A mouth wash.
Compositus	Co. Comp	Compound.
Congius	C	A gallon.
Confectio	Conf	A confection.
Cortex	Cort	Bark.
Cum		With.
Decoctum	Decoc	A decoction.
Dilute, Dilutus	Dil	Dilute.
Dimidius	Dim	One-half.
Divide	D. Div	Divide (thou.)
Dividendus	Dividend	To be divided.
Dividatur in partes æquales.	D in p æq	Let it be divided into equal parts.
Dosis	Dos	A dose.
Emplastrum	Emp	A plaster.
Enema	Enem	An enema.
Extende supra	Exten Sup	Spread upon.
Extractum	Ext	An extract.
Fac. fiat. fiant	F	Make, Let be made.
Filtrum	Fil	A filter, Filter (thou).
Fluidus	Fl. f	Fluid.
Gargarisma	Garg	A gargle.
Glyceritum	Glyc	A Glycerite.
Gutta, Guttæ	Gtt	A drop, Drops.

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LATIN WORD.	ABBREVIATION.	TRANSLATION.
Guttatim	Guttat	Drop by drop.
Haustus	Haust	A draught.
In dies	Ind	Daily.
Infusum	Inf	An infusion.
Injectio	Inj	An injection.
Instar	Inst	Like.
Lac		Milk.
Layena		A flask or bottle.
Libra	Lb ℔	A pound.
Linteum		Lint.
Liquor	Liq	A solution.
Lotio		A lotion.
Mane primo	Mane pr	Very early in the morning.
Magnus	Mag	Large.
Massa	Mass	A pill mass.
Mica panis	Mic pan	A crumb of bread.
Misce	M	Mix.
Mistura	Mist	A mixture.
Mucilago	Mucil	A mucilage.
Nox. Nocte Maneque		Night; At night and in the morning.
Numems, Numero	No	A number, In number.
Octarius	O	A pint.
Ovum, Ovi	Ov	An egg.
Optimus	Opt	Best.
Pars	Par	A part.
Partes æquales	P æ	Equal parts.
Parvus	Parv	Small.
Pediluvium		A foot bath.
Pencilium Camelinum	Pencil Cam	A camel's-hair pencil or brush.
Per fistulam vitreum		Through a glass tube.
Phiala	Phil	A vial.
Pilula	Pil	A pill.
Pro re nata	P r n	According to circumstances, occasionally.
Pulvis	Pulv	A powder,
Quantum Sufficiat	Q S	As much as is necessary.
Quaqua hora	Q h	Every hour.
Saturatus	Sat	Saturated.
Scatula	Scat	A box.
Semissis	Ss	A half.
Semidrachma	Semidr	A half drachm.
Sesuncia	Sesunc	An ounce and a half.
Signa	S Sy	Sign.
Sine		Without.
Solve, Solutus	Solv	Dissolve, Dissolved.
Solutio	Sol	A solution.
Spiritus	Spr	A spirit.
Statim	Stat	Immediately.
Suppositoria	Suppos	A suppository.
Syrupus	Syr	A syrup.
Talis	Tal	Such or like.
Tinctura	Tra Tr Tinct	A tincture.
Trochischus (*Trokiscus*)	Troch	A troche.
Tritura	Trit	Triturate.
Tere Simul	Ter Sim	Rub together.
Ter in di	T i d	Three times a day.
Unguentum	Ungt	An ointment.
Vinum	Vin	A wine.
Vehichulum	Vehic	A menstrum.
Vitellus	Vit	The yolk (of an egg).
Vitello Ovi Solutus	V O S	Dissolved in yolk of an egg.

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APPROXIMATE MEASURES.

A drop=usually about ♆ minim.
A teaspoonful=60 drops f ℥j.
A dessertspoonful=f ℥ij.
A tablespoonful=f ℥ss.
A wineglassful=f ℥ij.
A teacupful=f ℥ix.

TABLE TO ASSIST THE BEGINNER IN PRESCRIBING LIQUIDS.

Having fixed upon the bulk of his liquid he will remember that there are in

1 fluid ounce, 8 teaspoonfuls each 1 fluid drachm.
2 fluid ounces, 15 teaspoonfuls each 1 fluid drachm.
4 fluid ounces, 30 teaspoonfuls each 1 fluid drachm.
4 fluid ounces, 15 dessertspoonfuls each 2 fluid drachms.
6 fluid ounces, 20 dessertspoonfuls each 2 fluid drachms.
6 fluid ounces, 12 tablespoonfuls each ♆ fluid ounce.
8 fluid ounces, 15 tablespoonfuls each ♆ fluid ounce.
1 pint, 30 tablespoonfuls, each ♆ fluid ounce.
1 pint, 8 wineglassfuls each 2 fluid ounces.

TABLE FOR CALCULATING THE PERIOD OF UTERO-GESTATION.

NINE CALENDAR MONTHS.			TEN LUNAR MONTHS.	
From	*To*	*Days.*	*To*	*Days.*
January 1	September 30	273	October 7	280
February 1	October 31	273	November 7	280
March 1	November 30	275	December 5	280
April 1	December 31	275	January 5	280
May 1	January 31	276	February 4	280
June 1	February 28	273	March 7	280
July 1	March 31	274	April 6	280
August 1	April 30	273	May 7	280
September 1	May 31	273	June 7	280
October 1	June 30	273	July 7	280
November 1	July 31	273	August 7	280
December 1	August 31	274	September 6	280

The above Obstetric "Ready Reckoner" consists of two columns, one of calendar, the other of lunar months, and may be read as follows: A patient has ceased to menstruate on the first day of July; her confinement may be expected at soonest about the 31st of March (*the end of nine calendar months*); or at latest, on the 6th of April (*the end of ten lunar months*). Another has ceased to menstruate on the 20th of January; her confinement may be expected on the 30th of September, plus 20 days (*the end of nine calendar months*), at soonest; or on the 7th of October, plus 20 days (*the end of ten lunar months*), at latest.

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COMMON NAMES OF CHEMICAL SUBSTANCES.

COMMON NAMES.	CHEMICAL NAMES.
Aqua Fortis	Nitric Acid.
Aqua Regia	Nitro-Muriatic Acid.
Blue Vitriol	Sulphate of Copper.
Cream of Tartar	Bitartrate Potassium.
Calomel	Chloride of Mercury.
Chalk	Carbonate Calcium.
Caustic Potassa	Hydrate Potassium.
Chloroform	Chloride of Gormyle.
Common Salt	Chloride of Sodium.
Copperas, or Green Vitriol	Sulphate of Iron.
Corrosive Sublimate	Bi-Chloride of Mercury.
Diamond	Pure Carbon.
Dry Alum	Sulphate Alluminum and Potassium
Epsom Salts	Sulphate of Magnesia.
Ethiops Mineral	Black Sulphide of Mercury.
Fire Damp	Light Carburetted Hydrogen.
Galena	Sulphide of Lead.
Glauber's-Salt	Sulphate of Sodium.
Glucose	Grape Sugar.
Goulard Water	Basic Acetate of Lead.
Iron Pyrites	Bi-Sulphide Iron.
Jeweler's Putty	Oxide of Tin.
King's Yellow	Sulphide of Arsenic.
Laughing Gas	Protoxide of Nitrogen.
Lime	Oxide of Calcium.
Lunar Caustic	Nitrate of Silver.
Mosaic Gold	Bi-Sulphide of Tin.
Muriate of Lime	Chloride of Calcium.
Nitre of Saltpetre	Nitrate of Potash.
Oil of Vitriol	Sulphuric Acid.
Potash	Oxide of Potassium.
Realgar	Sulphide of Arsenic.
Red Lead	Oxide of Lead.
Rust of Iron	Oxide of Iron.
Salmoniac	Muriate of Ammonia.
Salt of Tartar	Carbonate of Potassa.
Slacked Lime	Hydrate Calcium.
Soda	Oxide of Sodium.
Spirits of Hartshorn	Ammonia.
Spirit of Salt	Hydro-Chloric or Muriatic Acid.
Stucco, or Plaster of Paris	Sulphate of Lime.
Sugar of Lead	Acetate of Lead.
Verdigris	Basic Acetate of Copper.
Vermillion	Sulphide of Mercury.
Vinegar	Acetic Acid (Diluted).
Volatile Alkali	Ammonia.
Water	Oxide of Hydrogen.
White Precipitate	Ammoniated Mercury.
White Vitriol	Sulphate of Zinc.

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Proprietary and Elegant Preparations.

MEDICATED PADS.

Medicated pads are quite popular with many who have tried them, and a multitude of remarkable cures are attributed to their use. We here present formulas equal to the best, and as they are quite simple to prepare they can now be tried with but little expense:

Liver Pad.

Red Cinchona Bark (powder)	4 ounces.
Fenugreek Seed (powder)	1 ounce.
Mandrake Root (powder)	1 ounce.
Black Root (powder)	1 ounce.
Gum Guaiac (powder)	3 ounces.
Bayberry Bark (powder)	4 drachms.
Oil of Eucalyptus	4 drachms.

Grind the drugs with the powdered guaiac and add the oil. The above is sufficient for two pads, which should be made into an oblong or diamond shape, with linen or muslin, and worn over the pit of the stomach. Liver pads are recommended for all diseases arising from a disordered liver.

Kidney Pad.

Useful in all diseases of the kidneys.

Digitalis Leaves	2 ounces.
Black Cohosh	1 ounce.
Gum Benzoin (powdered)	1 ounce.
Gum Guaiacum (powdered)	1 ounce.
Juniper berries	1 ounce.
Queen of the Meadow	1 ounce.
Oil Juniper	2 ounces.

Grind the drugs to a moderately fine powder, and mix with the oils and gums. Make an oblong pad and wear over the kidneys.

Lung Pad.

Useful in consumption and diseases of the lungs.

Grindelia Robusta	1 ounce.
Skullcap Leaves	1 ounce.
Blueberry Root	½ ounce.
Blood Root	½ ounce.
Yerba Santa	1½ ounces.
Gum Ammoniac	1 ounce.
White Pine Turpentine Gum	1½ ounces.
Oil of Tar	1 ounce.
Oil of Eucalyptus	1 ounce.
Oil of Sassafras	1 ounce.

Grind the drugs to a moderately fine powder and mix them with the oils and gums. Make an oblong pad and wear well up to the throat.

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Liniments.

Wonder Liniment.

Oil of Sassafras	8 ounces.
Oil of Cloves	2 ounces.
Oil of Turpentine	4 ounces.
Stronger Water of Ammonia	1 ounce.
Sulphuric Ether	4 ounces.
Chloroform	2 ounces.
Camphor	2 ounces, av.
Alcohol sufficient to make	1 gallon.

Mix and dissolve.

As a universal liniment for both internal and external use this is without an equal for relieving pain. It is used where any liniment is likely to do good in all aches and pains. Preparations of this nature when used externally should be applied plentifully and vigorously. This is the reason why itinerant venders of liniments under various titles such as Wizard Oil, Pain Killer, Instant Relief, etc., produce such remarkable cures in public. Their remedies all possess more or less remedial value, but without brisk and patient rubbing they would do as little good when applied externally as so much cold water. Now that a reliable formula is at hand a quantity of this Wonder Liniment can be prepared at a minimum cost without paying for bottles, labels, advertising, salaries, rents, etc., which are the necessary expenses of all medicine firms, and which ultimately are borne by the consumer.

Liquid Lightning.

An excellent liniment for external application, which has been sold under various names, is prepared as follows:

Essential Oil of Mustard	2 drachms.
Aconitia	2 grains.
Glycerine	2 ounces.
Alcohol	4 ounces.

Mix, and apply by rubbing with the hand. This is useful in rheumatism, neuralgia, headache, toothache, and all nervous pains.

Perry Davis' Pain Killer.

Spirits of Camphor	2 ounces.
Tincture of Capsicum	1 ounce.
Tincture of Guaiac	½ ounce.
Tincture of Myrrh	½ ounce.
Alcohol	4 ounces.

Mix.

Hamlin's Wizard oil.

Tincture of Camphor	1 ounce.
Aqua Ammonia	½ ounce.
Oil of Sassafras	½ ounce.
Oil of Cloves	1 drachm.
Chloroform	2 drachms.
Turpentine	1 drachm.
Alcohol	3½ ounces.

Mix.

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Mexican Mustang Liniment.

Petroleum
Olive Oil
Carbonate of Ammonia
} Equal parts and mix.

Merchant's Gargling Oil.

Linseed Oil.....2½ pints.
Spirits of Turpentine.....2½ pints.
Western Petroleum.....1 pint.
Liquor Potassa.....1 ounce.
Sap Green.....1 drachm.

Mix.

Radway's Ready Relief.

This remedy, according to Peckolt, is an ethereal tincture of capsicum with alcohol and camphor.

Liver Regulator.

Senna Alex.....12 drachms.
Podophyllin.....3 drachms.
Leptandria Virg.....3 drachms.
Virginia Snake Root.....6 drachms.
Ginseng.....3 drachms.
Alcohol.....6 ounces.
Boiling water, to make.....1 quart.

Dose, teaspoonful to one-half wineglassful, as needed. For all bilious diseases or disorders arising from torpidity of the liver, dyspepsia, bilious headache, costiveness, sour stomach, jaundice, heartburn, nervousness, restlessness, etc.

Elixir Cascara Sagrada Compound

Fluid Extract Cascara.....4 ounces.
Tincture Nux Vomica.....1 drachm.
Glycerine.....2 ounces.
Syrup of Ginger.....2 ounces.
Peppermint Water.....4 ounces.
Simple Elixir, to make.....1 pint.

Mix and filter.

Dose, one teaspoonful before eating. For headache, constipation, biliousness, dyspepsia, or all diseases arising from torpidity of the liver.

Kilner's Formulary.

Dr. Hamilton's Blood Purifier.

Better than S. S. S. or any blood medicine on the market. A specific for scrofula, syphilis, rheumatism, and all impurities of the blood:

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Black Cohosh	1 ounce.
Blood Root	½ ounce.
Poke Root	1 drachm.
Elder Flowers	1½ ounces.
Sassafras Bark	½ ounce.
Spikenard Root	1½ ounces.
Alcohol	4 ounces.
Water	4 ounces.
Simple Elixir, q. s. to make	1 pint.

Macerate the drugs with alcohol and water, and after a few days transfer to percolator. Percolate till clear, and then add to simple elixir.

Dose, one to two teaspoonfuls three times a day.

Blood Purifying Tea.

Burdock Root, cut	2 ounces.
Blue Flag Root, cut	2 ounces.
Dandelion Root, cut	1½ ounces.
Sassafras Root, cut	½ ounce.
Sarsaparilla Root, cut	2 ounce.
Wild Cherry Bark, cut	1 ounce.
Yellow Dock Root, cut	½ ounce.

Mix thoroughly. Take two ounces of the tea and steep in a quart of water, with gentle heat, for two hours; strain off 1½ pints into a quart bottle and add half a pint of alcohol and 4 ounces of sugar. The dose is a wineglassful for adults before meals and at bedtime; children, in proportion to age.

Warner's Safe Kidney and Liver Cure.

In Germany each maker of patents must furnish the Government with the formula for the patent he makes. This is the one furnished by Warner for "Safe Kidney and Liver Cure." Each bottle contains:

Extract of Lycopus Virginiana (the herd)	308 grains.
Extract of Hepatica (the herb)	232 grains.
Extract of Gaultheria	7½ grains.
Potassium Nitrate	39 grains.
Alcohol (90°)	2½ ounces.
Glycerine	10 drachms.
Water, sufficient to make	1 pint.

Any one can now make this preparation equally as well as Warner.

Fenner's Formulary.

Electric Catarrh Remedy.

This remedy, under various electrical names, is inclosed in a closely stoppered bottle or box containing a bit of zinc and copper to which is attached a piece of cotton or sponge saturated with the preparation,

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which is very volatile and irritating to the mucuous membrane, and produces by inhalation a decided effect at once. The patient is led to believe that there is some electrical value attached to the combination, and, strange to say, in the face of such absurdity it has many votaries; however, notwithstanding the electrical deception it has merits as an inhalant, and remarkable cures of catarrh, headache, neuralgia, etc., are ascribed to its use. The following is the required formula:

Essential Oil of Mustard.....1 ounce.
Carbolic Acid.....1 ounce.
Oil of Hemlock.....1 ounce.
Camphor.....1 ounce,
Alcohol.....4 ounces.

Mix and dissolve. This can also be used as an external application, though not so good as another under the head of "Liquid Lightning" (see page 119).

Catarrh Snuff.

Calomel.....1 drachm.
Camphor, pulverized.....1 drachm.
Acacia.....2 drachms.

Catarrh Salve.

The following remedy for catarrh, and other uses for which it is recommended, was patented by William H. Thomas of Los Angeles, Cal. From the nature of its ingredients and mode of preparation we are led to believe that it is the most elegant and effective of all the "salve catarrh remedies" that have been brought to our notice:

Petrolatum.....1 ounce.
Pimento (powd. allspice).....4 grains.
Thymol.....4 grains.
Boracic Acid.....2 grains.
Subnitrate of Bismuth.....2 grains.
Spirit of Wintergreen.....3 drops.
Cassia Lanceolata Leaves (senna)..... ½ ounce.

The boracic acid, subnitrate of bismuth, thymol, and pimento is placed in a mortar and reduced to a fine powder. The leaves of the cassia lanceolata are subjected with the petrolatum to a sufficient degree of heat to extract the active principles of the leaves, after which the petrolatum is strained off and added to the powdered substances before mentioned with the spirit of wintergreen, the whole being thoroughly commingled and mixed in any convenient manner. In using the compound it is applied locally in the usual manner by means of the fingers or any material by which the application can be thoroughly effected. As an ointment it is especially applicable to the treatment of catarrh, malignant sores, abrasions, and other affections where a local remedy can be applied.

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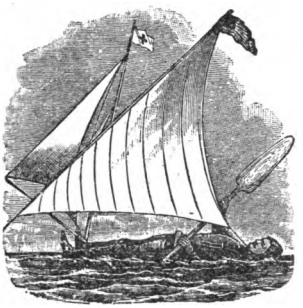
Rubber Patching and Waterproofing.

Capt. Paul Boyton, the famous aquatic voyager in his rubber suit, has furnished us two practical suggestions in regard to patching rubber boots, coats, etc., and also to waterproof sails, tents, awnings, and similar fabrics.



To Patch a Rubber Boot or Garment.

Take a piece of sand-paper and roughen the edges of the break as far around as the size of the patch. Next apply rubber cement to the roughened surface, and at the same time cement a piece of rubber cloth or cloth well coated with the cement. Let both remain for four hours in a place free from dust. Then put on another thin coat of cement and let them lay for about two hours. Next place the patch carefully over the break and hammer well together. Let stand for a few hours and the place will be as strong and tight as ever. Be sure the patch and the article to be patched are perfectly dry before applying the cement.

Pure natural rubber or rubber cement can be obtained at any rubber store, also prepared patch cloth.

To Make Rubber Cement.

Take half a pound of pure natural rubber, cut it into small pieces, and dissolve it in a sufficient quantity of 100 proof naptha. It will take from two to three days to dissolve properly.

To Waterproof Canvas or Cloth.

Take one pound of yellow paraffine wax and dissolve in one quart of benzine. Apply with a brush.

To Make Tissues Incombustible.

The Societé d' Encouragement of Paris has recently awarded a prize of 2,000 francs to J. A. Martin of Paris for the following preparations for making tissues fire-proof. The conditions under which the award was offered were as follows: The ingredients constituting the preparations must be cheap and easily applied, must neither injure the tissues themselves nor their colors, must be neither of a poisonous nor caustic nature, must not change in a very moist nor very dry atmosphere, and

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finally the impregnated tissues and wood must remain incombustible after they have been exposed for one month to a temperature of 100° to 120° Fahr. It was found that Martin's fluids made the tissues and the surface of wood incombustible, that they do not attack the tissues and their colors, and that they remained incombustible after having been exposed for several months in a drying chamber to a temperature of 97° Fahr. The experiments were made by the Society and at the same time in the different Paris theaters.

For all Light Tissues.

Ammonium Sulphate	8 parts.
Pure Ammonium Carbonate	2½ parts.
Boracic Acid	3 parts.
Starch	2 parts.
Water	100 parts.

Two-fifths part of dextrine (or the same quantity of gelatine) may be substituted for the 2 parts of starch. The fluid is heated to 85° Fahr. and the tissues immersed in it until they are thoroughly permeated. They are then slightly wrung and dried sufficiently for ironing. The quantity of the starch or dextrine or gelatine may be changed according as the tissues are to be more or less stiff.

For Painted Decorations and Wood.

Sal-ammoniac	15 parts.
Boracic Acid	5 parts.
Glue	50 parts.
Gelatine	1½ parts.
Water	100 parts.

Add sufficient powdered talc to give the mass the necessary consistency. For use it is heated to 120° or 140° Fahr. and applied with a brush. For decorations already painted it suffices to apply it to the back and wooden frames.

For Coarse Linen, Ropes, Straw, and Wood.

Sal-ammoniac	15 parts.
Boracic Acid	6 parts.
Borax	3 parts.
Water	100 parts.

The fluid is heated to 220° Fahr. and the articles are submerged in it for 15 to 20 minutes, wrung out slightly, and dried.—*Techno-Chemical Receipt Book.*

Gold and Silver Inks.

Take equal parts of gold leaf (or silver leaf) and honey. Triturate them in a mortar until perfectly fine, add about 30 parts hot water, and triturate. Allow to settle and pour off the water. Triturate again with fresh hot water. Allow to settle and pour off as before. Repeat the washing several times until the honey is all washed out, then dry the powdered gold leaf and mix it with water and gum arabic. It must be shaken occasionally while writing. Very fine bronze may be made into ink by adding water and gum arabic and shaking occasionally while writing. (For other inks see page 20.)

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Worcestershire Sauce.

The composition of this sauce is a trade secret, but a variety of similar sauces are found on the market. A good imitation may be made as follows:

Chop the green outer covering of unripe walnuts 5 pounds, bruise them to a pulp in a mortar, pour upon them 6 pints of good strong vinegar, and after standing a day heat to boiling and strain with strong pressure. To the liquid thus obtained add garlic, grated to a pulp, 2 ounces; capsicum, in fine powder, 2 ounces; black pepper, 1 ounce; cinnamon, 1½ ounces; nutmeg, ½ ounce; allspice, 1 ounce; cloves, ½ ounce, all in fine powder; salt, 12 ounces; brown sugar, 8 ounces, and enough good vinegar to make 1 gallon of the finished product. This is to stand for some time, with frequent agitation, and then be put up in bottles.

Butter Color.

Annatto, fresh and of good quality, 2 pounds; salad oil of good quality without flavor (purified cotton-seed oil is best), sufficient to make 1 gallon. Rub the annatto with a portion, about one-third, of the oil and macerate it by the heat of a water-bath for 12 hours, stirring occasionally, pour off the liquid and add to the residue another portion, about one-third of the oil, and macerate as before, adding the product of the portion before reserved, then add the remainder of the oil to the sediment, macerate as before and add the product to the reserved portions to make 1 gallon of butter color.—*Fenner's Formulary.*

Rarey's Original Horse Liniment.

Alcohol (95°)	8 ounces.
Spirit of Turpentine	8 ounces.
Oil of Sassafras	1 ounce.
Oil of Pennyroyal	1 ounce.
Oil of Origanum	1 ounce.
British Oil	1 ounce.
Tincture of Arnica	1 ounce.
Tincture of Cantharides	1 ounce.
Tincture of Camphor	1 ounce.
Aqua Ammoniæ	1 ounce.

Mix them, and make a liniment.

Hog Cholera Cure.

Powdered mandrake, 4 pounds; powdered charcoal, 2 pounds; powdered resin, 1 pound; powdered saltpetre, 1 pound; powdered madder, 1 pound; powdered bicarbonate of soda, 11 pounds. Mix thoroughly. Give a tablespoonful daily in feed; as a preventive, give twice a week.

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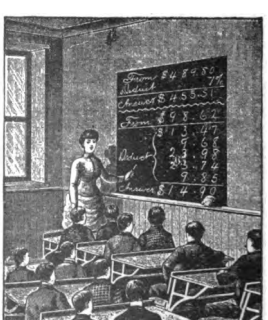

RAPID
DISCOUNT AND BOOK-KEEPERS' SUBTRACTION.

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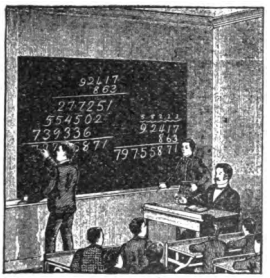

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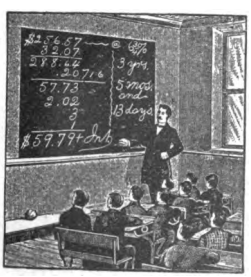

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(SEE INSIDE OF SECOND COVER.)

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Accurately adjustable to any month in any year from the commencement of the Julian Calendar (OLD STYLE), 46 B. C., to A. D. 1800, and from the commencement of the Gregorian Calendar (NEW STYLE), Oct. 15, A. D. 1582, to A. D. 2400.

The Julian Calendar, or **Old Style**, was in use in all Catholic countries until 1582, when the Gregorian Calendar, or **New Style**, was adopted. It was not adopted in England and America until 1752. The Old Style is still used in Russia. *

EXPLANATION.—By Centurial Years are meant the **hundreds**, as 100, 500, 1800, etc. The Centurial Years (with ciphers omitted), both **O. S.** and **N. S.**, can be seen through the aperture in the *upper disk* when it is revolved. On the upper disk in spiral form are arranged the *years* of the *century*, as 1776, 1889, etc., only the last two figures of the years being retained.

When the Calendar for any *month* in any *year* is required, turn the Centurial Year (**O. S.** or **N. S.**, as required,) until it is shown in the aperture. The two disks are now set for the given century. Next find the year of the century on the upper disk, and turn both disks until it is directly beneath the given month and the calendar for the month is adjusted below, the large figures below representing the dates of the month and the corresponding days of the week are found just above them on the disk.

Columbus discovered America Oct. 12, 1492 (O. S.) Required the day of the week:

We turn the disk until 14 (on a line with "Old Style") is shown in the aperture. Next find '92 on the upper disk and turn it under Oct. (given month), and the full month is adjusted. Look below and find 12 (given date of month) and just above on the wheel is shown Friday, answer.

When it is desired to adjust the Calendar to **January** or **February** in a **leap year** turn the year one division or space to the *left* of the month, making a difference of *one day of the week less*. *Years* of the *Century* having a dart pointing to them are *leap years*. The centurial years of the Gregorian Calendar are not leap years unless divisible by 400; **1600**, **2000** etc., being leap years, while 1700, 1800, 1900 are common years. All the centurial years of the Julian Calendar are *leap years*.

Besides correcting or verifying the dates of births, marriages, deaths, history etc., the Perpetual Calendar is useful in finding the dates of elections, courts, etc. The Presidential election happens every four years on the *first* Tuesday after the *first* Monday in November. Required the date of its occurrence in 1900. Turn 19 (N. S.) until it appears in the aperture. As the year of the century is '00 we turn '00 under Nov., which gives the full month below. It will be observed that the *first* Monday will be on the 7th, consequently the *first* Tuesday following will be on the 8th, answer.

* According to this principle the calendar for both **O. S.** and **N. S.** can be arranged forever. This is one of the best of a great number of different styles of Perpetual Calendars invented by Prof. David.

For interesting historical information concerning calendars, together with mental rules for telling the day of the week forever, Easter Sundays, age of moon, etc., see *DAVID'S SHORT-RULE ARITHMETIC.*

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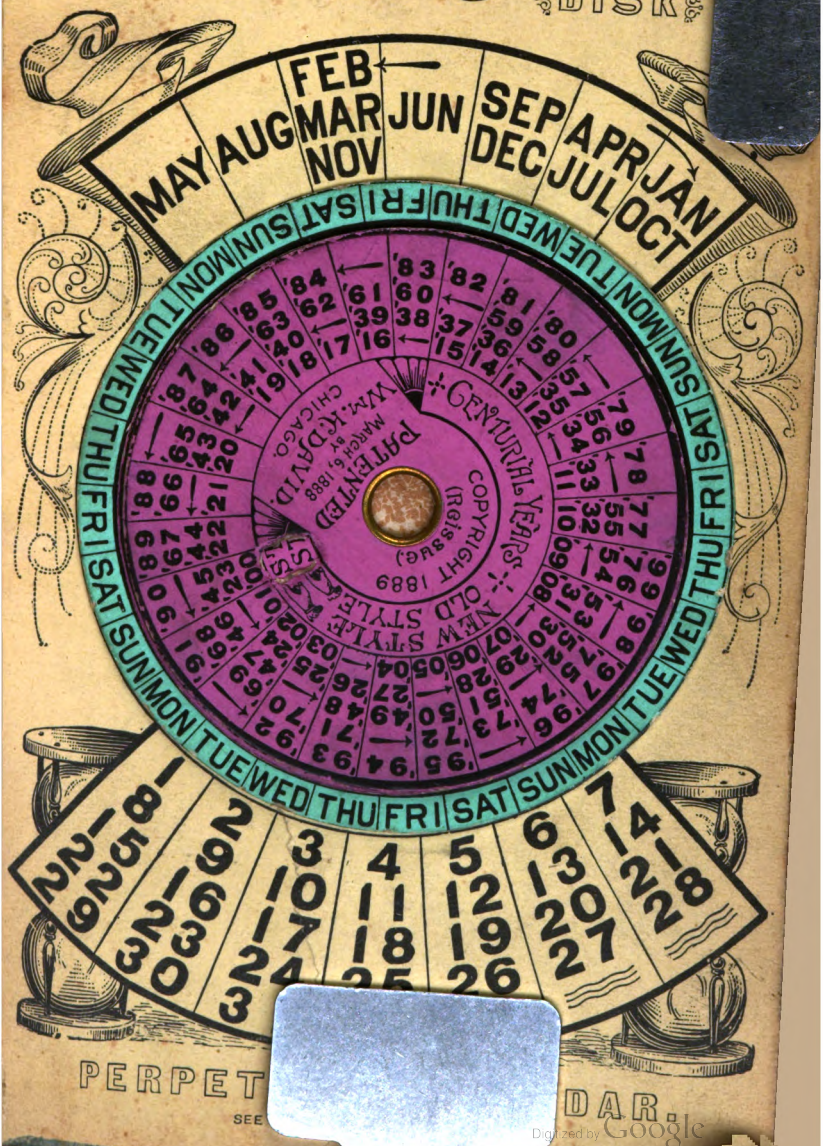
HC 25VD

DAVID'S DOUBLE DISK



PERPET DAR.

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